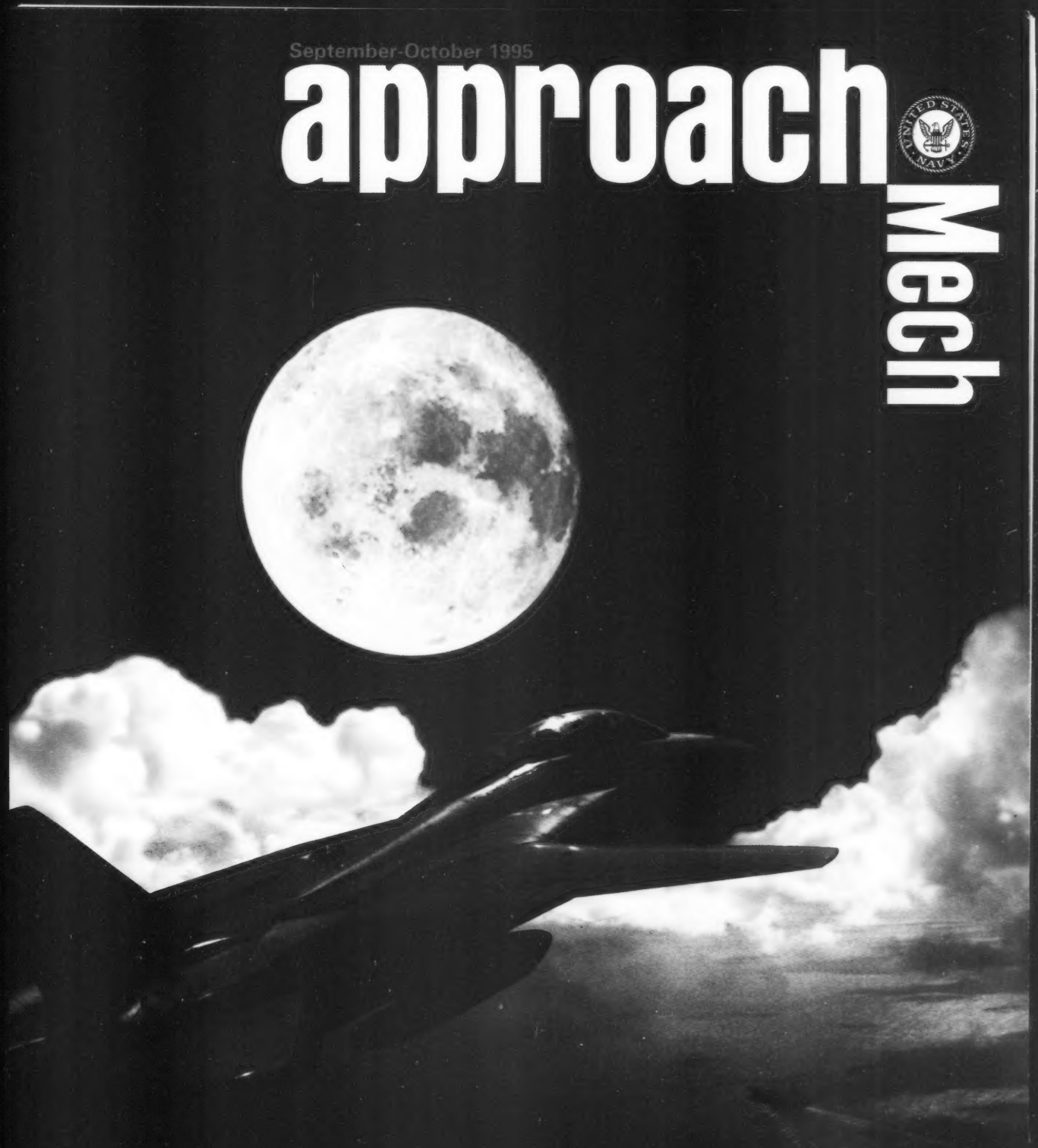
September-October 1995

approach Mech



Here's What Happened

You took the time to write that article your buds told you would be perfect. You sat down after a hard day's flying or working the flight deck, told your story, ran it through the chop chain, rewrote it like the XO suggested, and sent it to us. We either told you up front we couldn't use it, or we told you we would and never did. What happened?

The best articles are those where you illustrate your point with actual stories. Your theory of good tool-control policies will sound better if you write about an airplane's binding controls that came from a tool you had lost and reported fallen overboard. Aircrew-coordination stories sound better if they involve two pilots choking each others' oxygen hoses to make a point.

That hair-raising simulator ride doesn't hack it, either; that's what they're for. If a simulator session saves your life in a real situation, that is a good story. If you just became the safety officer and want to share all of the wisdom you've accumulated, the readers aren't interested. Likewise, if you just want to talk about the theory of mishap prevention, your story doesn't get very far.

Finally, no fiction allowed.

So, you wrote about a real-life experience and we still didn't use it. What's up? Well, the *Approach* side of *Approach/Mech* receives 350-400 articles a year from the fleet. We can only publish 90-120. *Mech* readers write 100-150 articles a year, and *Mech* has space for 45-60 published articles. We have to slant those stories toward our biggest problems: crew coordination and rule violations on the aviators' side, and skipping steps on the mechs' side. The magazine also uses space to present technical information and mishap analysis.

Even with all those submissions, we have holes. The Marines frequently call me to ask why they aren't getting enough copies, yet I received only five articles written by Marines all last year, three from the same officer. I know Marines can write — half of our Bravo Zulu submissions come from the Marine Corps.

The magazine thrives on the articles it gets from fleet writers. It is not - and I hope it never becomes - just a bulletin board for Safety Center advice. Keep submitting those articles. If you want to discuss an idea for an article, call me.

And if it helps any, *my* submission didn't get published when I sent it in from my squadron.

Lt. Ken Skaggs, Editor

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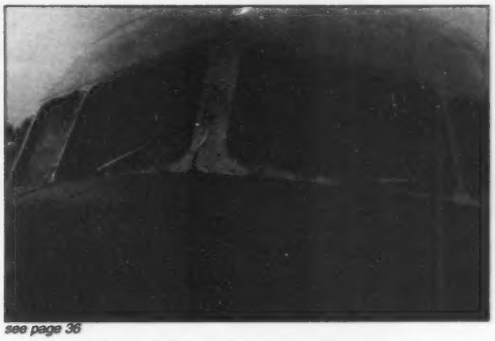

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Painted into a Co

by Lt. Glenn R. Jamison

I had already decided we would not attempt an airstart unless absolutely necessary.

It was another high-tension flight in support of Operation Southern Watch. Our station was over northern Saudi Arabia, 300 miles from the ship and 150 miles from the nearest divert, Kuwait International. Both my copilot and I were first-tour lieutenants with about the same number of hours. With a very junior front end, we launched with a senior CICO "baby-sitter."

Before selecting the sync-master during climbout, I noticed left-engine rpm was slightly below limits. It had been a repeat gripe in the ADB and selecting the right engine as master alleviated the problem, so we continued on with the flight.

With two hours left on station, I noticed a significant decrease in left-engine rpm, made apparent by the out-of-phase throbbing of the props. Disengaging the autopilot, I casually reached up and selected standby on the sync-master, expecting again to find the left-engine rpm slightly below limits. To my surprise, left-engine rpm dropped to 95.5 percent in both normal and mechanical governing—well below the NATOPS limits of 99.0-101.0 percent.

I was halfway through telling the rest of the crew that the left engine was well out of limits and we needed to head home when

The remaining engine could not maintain level flight, which meant we couldn't wave off.

PH1 Michael D.P. Flynn

the left-engine rpm surged twice and—flump!

Quickly caging my brain to the fact that the left engine had failed, I began running through the EPs for engine failure. When I came to step 3 (malfunctioning engine condition level), feather, I realized that the left prop was already feathered. Storing this fact in the back of my brain for later review, I had my copilot match condition-lever position to prop condition, and we continued with the post-shutdown procedures.

We discussed our situation with the Hummer rep, Black Eagle One, on JTIDS voice. He suggested we try an airstart on the failed engine. I had already decided we would not attempt an airstart unless absolutely necessary. We had no idea what caused the engine failure in the first place, and an airstart attempt might damage the engine or propeller. After consulting with the mechs, the skipper again recommended an airstart. He also told us that we would be recovering back onboard the ship whether the airstart was successful or not. Not overjoyed with this bit of news, I decided we would try an airstart, but only overhead our primary divert.

Twenty minutes later, still in a steady, but easy descent, we were 15,000 feet over Kuwait, ready for the airstart. As my copilot and I performed the airstart procedures, the left prop failed to come out of feather. We tried again, using the procedure for airstart-propeller failed to feather, without success. We told the skipper, but he confirmed we were still to recover aboard the CV. Not pleased at all with leaving a perfectly good field, I took up a heading toward the ship, another 150 miles away, and began considering again what was wrong with the left engine.

That bit of information concerning the prop "feathering" on its own suddenly came back to me. Mentioning it to my crew, we considered the possibility that the left engine might have seized with the prop at a high blade angle. Both the copilot and I took a closer look at the prop and determined it wasn't fully feathered—perhaps 75 to 78 degrees, instead of 80.5 degrees—which would certainly explain why we couldn't maintain altitude with full power at 13,000 feet (we were still in an easy descent). A prop that was not fully feathered would change everything. Bingo numbers were out the window, single-engine minimum-control speed (Vmc) would be higher, and single-engine climb rate in the landing configuration might be less than expected.

I relayed this new information to our rep, figuring we would be instructed to divert. The response did not change: we were to recover aboard the ship. Continuing toward the ship, we did a controllability check in the landing configuration at 5,000 feet. To our dismay, the remaining 427 engine could not maintain level flight, which meant we couldn't wave off. Quickly cleaning up and taking a vector toward our divert, I told the skipper about our slow-flight results and that we were diverting. Wrong answer. "They" wanted us aboard; I didn't want to come aboard. This created a problem.

Feeling like I was being painted into a corner and the boat was doing its best to kill all five of us, I took the defensive and told our rep, and everyone else listening in on the net, I felt the plane unsafe to bring aboard, and would only do so if ordered to. This got their attention. I got the famous "Roger, stand by," and continued toward our divert.

I didn't think twice about wind-over-deck–a mistake I'll never make again.

A bit more clear-headed now that we were heading back to a field, I took the skipper's suggestion, and did a power-response check in the landing configuration at 1,000 feet. Although we maintained level flight, it required 4,500 ISHP on the good engine (normally during field simulations, it requires approximately 3,200 ISHP), leaving only 600 ISHP for waving off. Setting a 500-fpm rate of descent and doing a simulated waveoff, I decided that although not the response I was hoping for, it was safe as long as I didn't get too far out of parameters.

I turned back toward the ship, told our rep that we could handle a wave-off, and that we had set up for a 10-mile straight-in.

I took a vector back to the ship, and began briefing the crew concerning backup and what was expected of them. Particularly important were airspeed (we didn't know what Vmc was) and procedures in the event of a waveoff or bolter.

Over button 6, the LSOs reported 34 knots slightly axial.

Caught up in briefing my crew, I didn't think twice about wind-over-deck—a mistake I'll never make again. The first approach was a lesson in why squadron SOP says to divert in the event of a single engine, unless a field is unavailable.

On and on until in close, I quickly became reacquainted with fear as the burble grabbed hold of the aircraft and began pulling. From the cockpit, the ball started a slight settle in close. I smoothly added power, but the ball continued to settle. The screaming power calls from both my copilot and LSOs were unnecessary; the power lever was already fire-walled. The ball continued to drop until it disappeared below the red cell. All I could do was maintain 20 units AOA, concentrate on centerline and pray. Our hook slammed down 10 feet forward of the rounddown, and we hook-skip all four wires. Climb performance off the bolter was far less than optimal, but safe once the gear came up.

After putting my seat cushion back where it belonged, I analyzed what had occurred and turned downwind for another pass. On the second attempt, with reduced wind-over-deck, I maintained a cell-high approach, anticipated the burble earlier, and trapped into an uneventful 1-wire.

Why did we bring this plane aboard? NATOPS clearly states to land as soon as possible. Squadron SOP says to divert unless a field is not available. Was the aircraft safe for an approach? My first pass indicated that it wasn't; however, we did make a successful second pass. We've been trained to bring aircraft aboard in similar configurations, but training and reality rarely match. As pilot-in-command, how large do you let the discrepancy between training and reality become before you decide the flight isn't safe and refuse to do what the reps want? When does "operational convenience" require you to pass up the safer options? It's important to realize the decisions you're expected to make as pilot-in-command aren't always yours to make. The boat clearly wanted us back aboard (primarily because it was our last day in the Arabian Gulf) even after I'd told them our wave-off capability was marginal.

Although we're all aware the captain of the ship has ultimate authority concerning aircraft diverts, most of us haven't had to face this reality or its consequences.

As it turned out, the prop was fully feathered and the engine hadn't seized. What we had experienced was normal power output for extremely hot, humid conditions, which I had not been trained to meet working in southern California. E-2C+ pilots need to rethink the faith we as a community have placed in the "all-powerful" T56-A-427 engine. My faith in it almost caused five aircrew to become a permanent addition to the jet-shop. ➤

Lt. Jamison flies with VAW-113.

The Killer Vapes

by Lt. Florence Kimball

We had just departed Kadena AFB on our last leg back to base with the usual two pallets of cargo and 45 passengers. We were actually on schedule. Imagine that!

About five minutes after takeoff the loadmaster called frantically asking us to immediately level off. Apparently one of the cruise boxes was leaking an unknown fluid. The copilot and I exchanged quizzical glances as I told ATC that we needed to stop our climb. What could be going on back there? The dreaded idea of turning back was becoming a possibility.

Finally, the flight attendant told us to land ASAP. The level-off had reduced the deck angle enough to slow the leak, but the crew still could not contain it. We asked what kind of fluid was leaking. Was it toxic? But all we got was a hurried, "The cruise boxes are locked. We think it might be freon because it's evaporating so rapidly and there's no odor. We're cleaning it up as fast as we can."

We reluctantly advised ATC that although there was no emergency, we needed to return and land at Kadena.

After a smooth overweight landing, we rolled into our parking spot and unloaded everything. We then broke the lock on the cruise box. Inside, an open metal container labeled "Trichlorotriflouroethane —Breathing Vapors May Be Fatal" lay on its side. [*"Trich" is an oil-free cleaning agent commonly used to clean aircraft oxygen systems.—Ed.*]

We left the pallets behind, loaded everyone back on the plane, and off we went. That night, three crew members became extremely sick, and were medically grounded the next morning. After making numerous phone calls to medical and the occupational health group, I discovered that this material, a type of freon, is not listed in the NAVSUP PUB 505 (Hazardous material guide for transportation), but the CNO had issued a warning: "Trichlorotriflourethane vapor is hazardous and can cause death if too much is breathed.

Here are a few things to consider.

1. Cockpit crew should go on oxygen the moment they detect a leak of an unknown material.

2. Aircrew should consider their own safety first and use portable oxygen and personal protective equipment (PPE) since hazardous materials can be absorbed through the skin.

3. Ensure that cruise boxes are unlocked once loaded on the aircraft, or that the keys are available. Never hesitate to use bolt cutters. ◄

Lt. Kimball flies with VR-56.

Sampling the Blackness

Rudy Llobet

For a new guy, I was starting to feel comfortable with carrier operations. I was in my first fleet squadron and had already spent seven months at sea.

After the brief, I pulled my RIO aside for a one-on-one about end speeds, emergencies, and eject criteria. It was business as usual as we preflighted and waited for a huffer for my sunset, Case I launch and dreaded Case III night recovery.

As launch time neared, the ship began its turn. The yellowshirts gave the signal to break us down, and we started taxiing to cat 1. I had an up aircraft, the only nuisance being a flickering vertical display indicator (VDI).

Thirty minutes into the flight, my VDI no longer flickered; I had lost it completely. I told my RIO, and he asked if I had any problem with coming back partial panel. I confidently responded, "No problem." This wouldn't be my first night recovery without a VDI. The rest of the flight went as briefed; I had a good airplane and no advisory lights–a pleasant surprise. The only thing I had to do was occasionally recage the standby gyro, which was usable but kept slowly precessing.

We established ourselves in the marshal stack and noted how clear the night was. With a nearly full moon, we could clearly see all the other jets' lights. It was a good night to not have a VDI.

We pushed on time, and things were looking good. As we approached level-off at 1,200 feet, we flew into clouds with thick, patchy haze. It looked like the ship had done her job and steamed to the only bad weather in the area. At 1,200 feet, conditions worsened. The flashing anti-collision lights from the airplane, combined with the clouds, gave me a slight case of vertigo. I came inside the cockpit and referenced my standby gyro for reassurance as I leveled the jet. I still felt like I was upside down, but my eyes were on the instruments, and I remembered to always believe them.

The next call from Approach was, "On glide path, going well left of course."

"How could this be?" my RIO asked, and "Why are we in a 30-degree left turn?" It was the beginning of a long night.

Then I began experiencing extreme vertigo, and I had no VDI or reliable standby gyro. Somehow, with the controller's help along with much-needed cheerleading from the back seat, I broke out of the clouds at 400 feet, three-quarters of a mile, slightly left of course. I had a big ship in front of me, and my senses came back. I just wanted to get aboard. Things were looking good, a little right for lineup…

Bolter, bolter, bolter, hook skip. I couldn't believe it. By this time, my RIO realized the situation. We were vectored around the bolter pattern, again in the clouds. I got vertigo again. I couldn't believe that out of all of my previous night traps, I had to hook skip now. By this time, I noticed that my gyro had precessed 30 degrees nose down, 20 degrees, right-wing down. Luckily, my RIO's standby gyro was working. Officially, I was along for the ride. My RIO did a great job of talking me around the pattern to something approaching a start. My head was spinning, and I had no sense of direction. My RIO knew I was having problems, but he had no idea of the extent. The calls kept coming from Approach: "Going above glide path, going further left of course, turn right 15 degrees."

My RIO was fighting to keep the wings level. The next thing I remember was him saying, "We're at 1,200 feet, 1.5 miles." I began a steep descent to intercept the glideslope, which only intensified my vertigo. I was showing 50 degrees, nose down on the standby but only 1,500 fpm on the VSI.

The nightmare continued until once again the ship came into view. I was starting to get my senses back. I relaxed a bit and thought, "At least that's over. We'll be on deck soon."

"205, Tomcat, ball, 5.5," I called.

"Roger, ball, you're high," the LSO replied. No problem. My vertigo was gone, and I was on a visual approach now. I only heard silence. Was the air source off? The ship was no longer in front of me, and I was in the black void again. I heard many voices on the radio, but I didn't think they were important.

My RIO yelled, "Climb, climb!" It was like a bad dream. Next, I heard the Air Boss screaming, "Burner! Burner! Pull back on the stick!"

I frantically selected burner and looked at the VDI. It was still black, so I looked at the altimeter. It read zero. I had nothing to reference and had no idea which way was up or down. My standby gyro said that I was in a slicing right-hand turn. The next thing I remember was being told to come out of burner passing 2,000 feet. The time between those two radio calls will be forever lost.

After the LSO, CAG, and the Air Boss realized my predicament, we diverted to NAF Atsugi where we declared an emergency. My RIO was so drained that he had trouble making his radio calls to the controllers at Center. I didn't realize how close we really came until we were safe on deck and I spoke to my backseater.

Looking at the PLAT tape, we saw the jet come across the rounddown high with my power set somewhere near idle. I hook-skipped the 4-wire and settled off the angle at approximately 110 knots with the engines still spooling up. From the lack of aircraft in the frames of film going away from the boat, we estimated that the aircraft settled down to 40 feet. My only saving graces were my nose-level attitude, ground effect, and two lifesaving calls from my RIO and the Air Boss.

Looking back, it's always easy to point out what went wrong and what could have been done to keep the situation under control. The blinking (and later inoperative) VDI during a night recovery, the unreliable standby gyro, and mostly, my not telling anyone about my problems were all factors that led up to this near-disaster.

Lt. Weissman flies with VF-21.

"Climb! Climb!... Burner! Burner! Pull back on the stick!"

Nuggets Ove

by Lt. Robert Jones

My RIO and I were first-cruise nuggets in the Arabian Gulf on the first deployment of the F-14D. As a section leader under training, I was enthusiastic about leading a 2 v 2 AIC hop even if it was a moonless night. The forecast called for 100 SCT 200 BKN 7 for our recovery.

The mission went well, and as our thoughts turned toward heading back, we noticed some cells building up in mother's general direction. The first real sign of things to come, however, was my CO calling us from his turning jet back on deck. The chuckles, the "You guys are gonna love this," and the scrubbed launch all clued us in to the fact that we were going to have a bit of weather for our recovery.

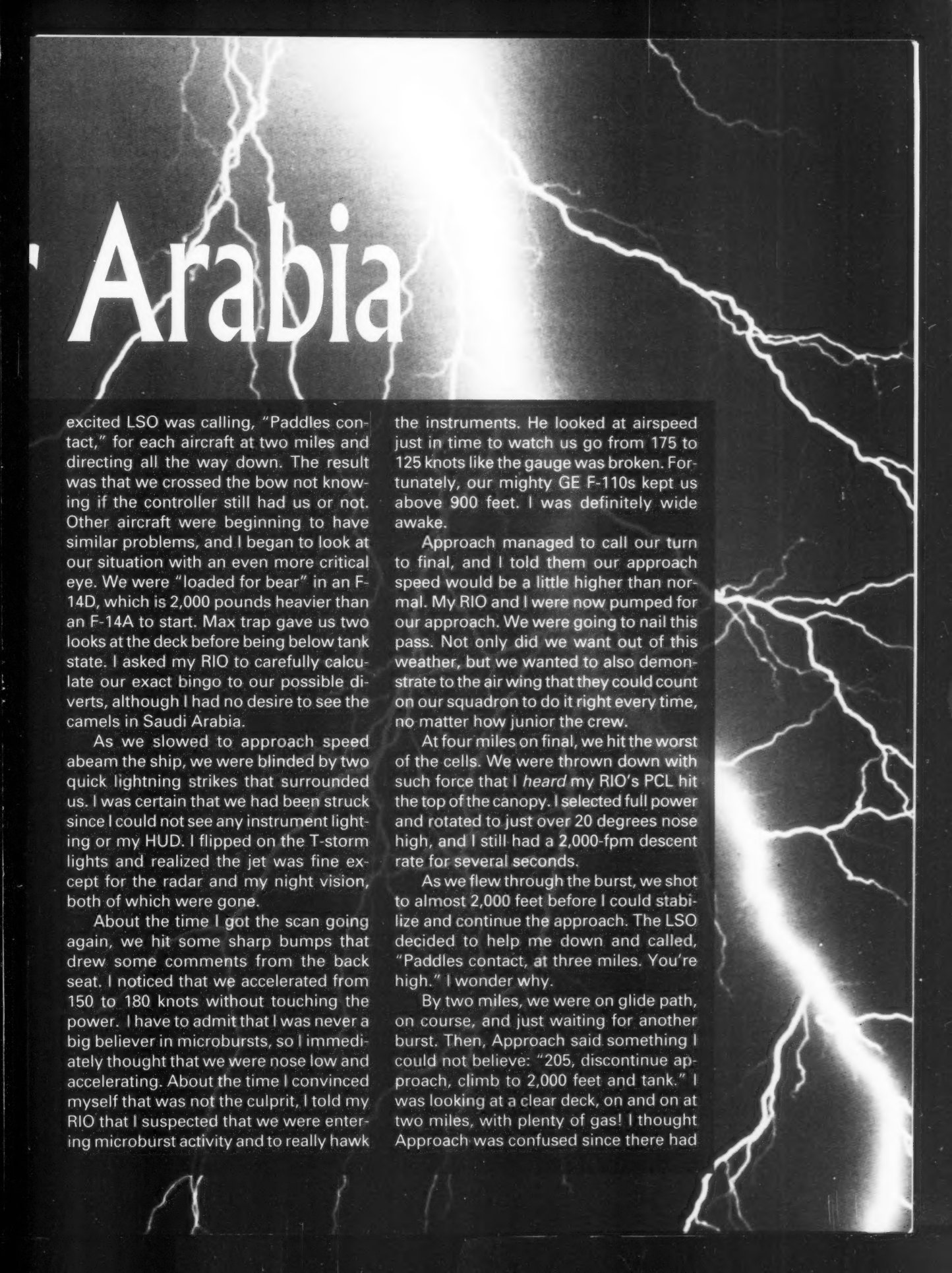
We closed on mom's position and had to penetrate a solid overcast from 40,000 feet to marshal altitude, dodging several imbedded cells on the way. Since my wingman's radar was a little shaky, I decided to keep him with me to help him avoid the cells. During the idle descent, I began to feel a little... impressed. I had never seen two 60,000-pound airplanes get tossed so violently. My RIO calmly directed us around the worst of the cells, all the while reassuring marshal that we didn't care if we violated some little rock's 12-mile standoff. My wingman was doing a great job of hanging on, but I was glad to finally drop him off at marshal.

Marshal had given us four or five push times and expected final bearings, so we waited for them to figure out which ones were correct. We heard a senior aviator report the position of the largest cell in the area to mom. He indicated she was steaming right for it. "Stand by" was the only response he received.

As we pushed from the top of the stack, it appeared that the ship had executed a couple of displacement rolls and was now vectoring aircraft for a right downwind recovery. Our controller was falling behind since every aircraft was on a vector and mother kept fishing for winds. He seemed to be hanging in there until we heard, "Power! Power! *Power*! Bolter! Bolter!" from an LSO. This had the surprising effect of driving our controller's voice up an octave.

As we broke out at 2,000 feet, still 10 NM upwind, I thought that finally we were going to earn a little of our flight pay. I have always believed that naval aviators generally have one thing in common: we like to be personally challenged in our aircraft. That's as close to a rationalization of the whole night-trap thing as I can get. At any rate, the lightning and turbulence at 1,200 feet, combined with the increasingly panicky controller and talkative LSO, motivated my RIO and me to really nail this pass.

The lightning was the most impressive I had ever seen, constant and in all quadrants. I noticed that we were on a vector that would have us cross the bow at about five miles, and we began trying to get a word in edgewise. Our controller was falling further behind as the now-



Arabia

excited LSO was calling, "Paddles contact," for each aircraft at two miles and directing all the way down. The result was that we crossed the bow not knowing if the controller still had us or not. Other aircraft were beginning to have similar problems, and I began to look at our situation with an even more critical eye. We were "loaded for bear" in an F-14D, which is 2,000 pounds heavier than an F-14A to start. Max trap gave us two looks at the deck before being below tank state. I asked my RIO to carefully calculate our exact bingo to our possible diverts, although I had no desire to see the camels in Saudi Arabia.

As we slowed to approach speed abeam the ship, we were blinded by two quick lightning strikes that surrounded us. I was certain that we had been struck since I could not see any instrument lighting or my HUD. I flipped on the T-storm lights and realized the jet was fine except for the radar and my night vision, both of which were gone.

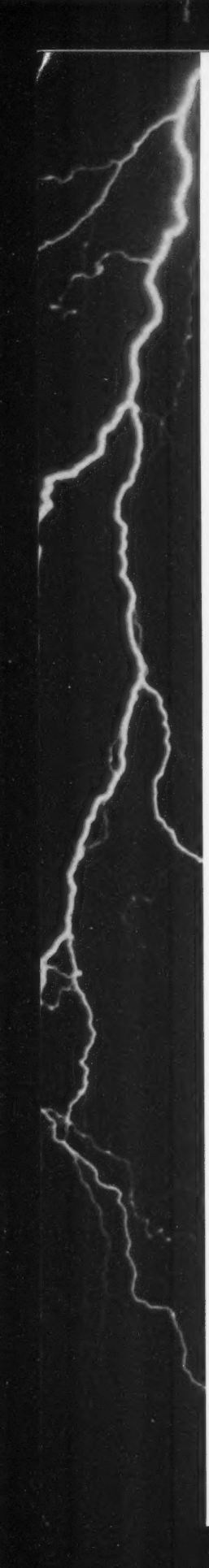
About the time I got the scan going again, we hit some sharp bumps that drew some comments from the back seat. I noticed that we accelerated from 150 to 180 knots without touching the power. I have to admit that I was never a big believer in microbursts, so I immediately thought that we were nose low and accelerating. About the time I convinced myself that was not the culprit, I told my RIO that I suspected that we were entering microburst activity and to really hawk the instruments. He looked at airspeed just in time to watch us go from 175 to 125 knots like the gauge was broken. Fortunately, our mighty GE F-110s kept us above 900 feet. I was definitely wide awake.

Approach managed to call our turn to final, and I told them our approach speed would be a little higher than normal. My RIO and I were now pumped for our approach. We were going to nail this pass. Not only did we want out of this weather, but we wanted to also demonstrate to the air wing that they could count on our squadron to do it right every time, no matter how junior the crew.

At four miles on final, we hit the worst of the cells. We were thrown down with such force that I *heard* my RIO's PCL hit the top of the canopy. I selected full power and rotated to just over 20 degrees nose high, and I still had a 2,000-fpm descent rate for several seconds.

As we flew through the burst, we shot to almost 2,000 feet before I could stabilize and continue the approach. The LSO decided to help me down and called, "Paddles contact, at three miles. You're high." I wonder why.

By two miles, we were on glide path, on course, and just waiting for another burst. Then, Approach said something I could not believe: "205, discontinue approach, climb to 2,000 feet and tank." I was looking at a clear deck, on and on at two miles, with plenty of gas! I thought Approach was confused since there had



already been some bolters in front of us. They repeated the command, so I figured they meant us.

As I added power and started to clean up, I met the tanker right over the ship, flying up the final bearing. My RIO mentioned something about how spectacular a midair would be right over mom, and I began to suspect that no one in the ship was very concerned about us. Based on the verbal picture, there were now two Tomcats, a Hornet, and an Intruder trying to find a tanker at 2,000 feet overhead the ship. We were all in instrument conditions, and our jet had no radar. We still had 4.3 on the gas, and we figured 3.6 was as low as we could get and still make our divert. So, being the motivated, can-do JOs that we were, we would just get a vector to the tanker, get plugged during a smooth spot, and return to mom. After all, diverting from the carrier in the Arabian Gulf is like removing a gun from a battleship. Besides, it would be admitting defeat.

Unfortunately, Departure made the last critical mistake of the evening. When we asked for a vector, we got a quick, "On your nose for five." The vector was away from the ship and right into the heart of a bad area of lightning. We pressed out that way for a minute and then asked for another vector. Again, we got, "On your nose," but the range had increased. We continued into the worst area of lightning and asked one more time. We got the same call, again with greater range.

My RIO, who had been displaying infinite patience, figured out that the calls were from the tanker to us. We turned around but since we didn't know the tanker's heading, the "on your nose" calls were useless. We did our best to stay VMC in a thunderstorm, but after a minute or two, we had to tell Departure that we were IMC and needed a vector *from* 205 *to* the tanker. This time we got, "205 is at your three o'clock for four." Again, no help.

Checking our fuel, I could not stare at the gauge hard enough to get anymore than 3.6 out of it. I told my RIO to try one more time and make it clear that we were leaving if they didn't answer us. His extremely calm, clear request for a vector resulted in a "Stand by." Departure sounded shocked when we told him we were "passing 10,000 feet, switching Dharan Approach."

I was disgusted with myself. We had not met the challenge. I was sure that the other aircraft still airborne were going to get their gas and get aboard. That would leave the nugget-nugget crew as the ones who couldn't make it. But as we broke out on top, I began to feel a little better. Looking behind us, I could see the tops of that storm going up to the high 40s. No wimpy storm there.

I remembered the aviator who called the storm's position 30 minutes before the ship entered it. I wondered if the ship could have avoided it. I thought about the fact that through the saturated controllers, comm jamming, lightning, and microbursts, we had made it to final. Steaming under that cell put the wind over the deck out of limits and canceled our only look at trapping.

Then, I thought of the circling aircraft, coaltitude over the ship, in and out of clouds and lightning, at night, with frazzled controllers. That couldn't be right. Things started falling apart as we left. Requests for divert states and "pigeons" from the remaining aircraft resulted in "Stand by" or briefs on barricade fuel states. Finally, all remaining aircraft were directed to divert. In all, five aircraft diverted that night with the only damage being some delamination of an A-6 intake from a lightning strike.

I'm glad that I didn't allow the disgust I felt for diverting prevent me from doing the right thing. I looked at that fuel gauge a long time, trying to find some excuse to stay around and keep playing. I'm also thankful that I had such a outstanding RIO that night. I can't overemphasize the value of staying calm on the radio, even if stuff is bouncing off your head and everyone else is screaming.

Most importantly, I'm glad my nugget bud and I got the opportunity to experience the night, thunderstorm, no gas, foreign land, challenge to our airmanship and judgement. We both learned a lot more than if we had the decisions made for us.◀

Lt. Jones flies with VF-31.

Say, "Cheese!"

by Cdr. J.F. Ward

"Cameras will be taken on every flight." Sounds familiar to all carrier aviators, right? We're supposed to take pictures if we intercept or fly by a target of interest. I can see the logic, however tenuous, but what is the net result—one picture worth developing from 15 sorties? Let's assume that picture will be worth it. We take the camera. But there's still a problem.

The cameras are usually 35mm SLRs, auto-cameras with the focus set at infinity. The problem is the FA-18 has no provision for carrying a large camera in the cockpit. Since my first cruise in 1981, camera technology has made tremendous advances. Today, there are cameras with more than adequate performance for SSC missions that will easily fit in my G-suit pocket and cost only a third of the big camera's price.

Twice this month alone, we have had bleed-air knobs broken in our jets by cameras coming loose on arrested landings. Pilot error was involved, to be sure, but the pilots were unnecessarily set up. The cost of replacing each knob was $660. Times two, the cost could have replaced the big cameras for both FA-18 squadrons on board and eliminated this hazard.

After the first incident, we had an APM to increase pilot awareness and review proper jury-rigging techniques for the camera. Two days later, a staff pilot, who had not been at the APM, broke off his bleed-air knob. More importantly, he didn't notice the knob missing, and it turned up behind a rudder pedal. Aargh!

Now, besides the threat to equipment during arrested landings and the associated cost of repair, what about in-flight hazards? I can't, for the life of me, feel good about full-blown ACM with a camera in the cockpit. My aircraft shouldn't be limited by the accessory equipment carried in the cockpit. I genuinely doubt that my ejection seat will work if a 35mm SLR falls in the space behind the seat. I have talked to several pilots who disagree, and surprisingly, they seem willing to bet their lives on it.

This command has sent two HAZREPS hoping to generate attention. At least one West Coast ship-air-wing team has procured pocket cameras, and I salute them. I hope this is my last cruise with the big ones.

Cdr. Ward is the CO of VFA-27.

Twice this month alone, we have had bleed-air knobs broken in our jets by cameras coming loose on arrested landings.

Peter Mersky

You Leave Me Brake

by Lt. Roger Budd and Lt. Brad Dennis

"Brakes, brakes, brakes!"
"They aren't working!"
"Anti-skid off."
"It is."
"Nosewheel steering?"
"Not responding."

"105, Tomcat, ball, 7.0."
"Roger, ball, 30 knots."
"Nice pass, looks like a 3-wire."
"Yeah, it looked good to me, too."
"Flaps coming, wings."
"Clear of the foul line, hands up for de-arm."

We had just completed a night AAWEX against a multiple-axis raid. Next up was the roll'em and midrats. Another pass at night on a pitching deck in the books.

Everything was going well during this first week of cruise. CQ was complete. We were now blue-water and flying cyclic ops to remain current. Now that the anxiety of waiting for cruise to start was over, attitudes were surprisingly upbeat throughout the air wing.

The yellowshirts were taxiing us into the last spot in the six-pack and as usual, they were shoehorning us much tighter than we would have liked. As we inched ahead, we were watching the captive Sidewinder get closer and closer to the stab of the adjacent F-14D.

"Menace," the RIO called, "go real slow, we are close to 115." Just when we reached our limit, the yellowshirt gave the tie-down signal, and we relaxed.

As we safed the seats and began to shut things down, we felt something different than the normal pitching deck. Sure enough, we were rolling forward into the landing area.

"Brakes, brakes, brakes!"
"They aren't working!"
"Anti-skid off."
"It is."
"Nosewheel steering?"
"Not responding."

Just like in the brief: on-deck emergency procedures—loss of brakes. The right brake assembly had failed with a loss of combined-hydraulic fluid. As we started to roll into the landing area, our lights came on and the hook went down. We called Tower to say we had no brakes. (We actually made the call twice, with lots of enthusiasm, since there was a Hornet on the ball.) Since there wasn't anything to our right to stop us or to run into, we tried using whatever nosewheel steering we had left to head toward the wires or the island.

As we rolled forward, the left wing scraped the adjacent aircraft, pushing us to the left as well. We were now in a slight left turn heading down the angle. We couldn't stop and could barely change direction.

"Budman, we're going to hit that E-2." With 30 knots of wind over the deck and both engines on-line, we began to pick up speed as we headed toward the Hummer hole. Luckily, the E-2 wasn't turning. The left shoulder station with the CATM-9 aboard struck the nose of the E-2, pulling us sharply to the left. The left side of the fuselage hit the engine and wingfold area of the Hawkeye; the propeller ended up between the front and rear seats. We immediately shut down both motors and waited for whatever would happen next. One of the E-2's propeller blades was directly over our canopy so getting out wasn't an option, yet.

Everything was quiet for a few minutes until the obvious, "What the heck happened?" discussion started. With all the commotion of the yellowshirts calling for a tractor and tow bar, the Boss calling "99, Delta easy," and start of the combat FOD

walkdown, one of our troubleshooters told us there was a huge pool of hydraulic fluid at our original parking spot. We were quickly pulled away from the Hummer and towed clear. We were still blue-water ops with planes airborne.

Of all the discussion about emergencies during any brief, the first one addressed is loss of brakes. Parking brake, anti-skid off, lights on, hook down, transmit, nosewheel steering on and ground loop, taxi through the arresting gear, or ultimately run into another aircraft. The heads-up you would anticipate for this emergency is a combined hydraulic failure with a total loss of fluid. The first indication we had was rolling into the landing area. After that, we were concerned only with stopping the aircraft on the flight deck. While loss of brakes isn't technically boldface, we treat it as such around the boat.

Many things could have happened during our 20-second slide across the flight deck. The left brake assembly could have failed, causing us to roll away from the island. We could have had live missiles aboard. The LOX bottle in the E-2 was crushed and could have exploded. There could have been an aircraft on short final unable to waveoff. There could have been someone in front of the landing gear when we started rolling forward. Finally, the E-2 could have been turning. Sometimes, you just get lucky.

The time to relax is when you get to the ready room. Once you see the yellowshirt give that wrap'em up signal, don't let your guard down. ◄

Lt. Budd and Lt. Dennis fly with VF-2.

"Budman, we're going to hit that E-2."

Ba-da-Bingo!

by Lt. Jeff Vanlobensels

When we manned up, we discovered that the ground crew hadn't filled the two drop tanks.

Fresh from the A-6 FRS, I was crewed with our squadron's most experienced first-tour BN. We had been flying together for a month when the skipper sent us and a playmate to Point Mugu to fly in three training exercises for Lobo Flag. In all, about 70 aircraft (tactical, large tanker, and early warning) from the Navy, Marine Corps, Air Force, and Canada would participate. This was my first time flying with other types of aircraft, but my BN had just returned from deployment; it was old hat for him.

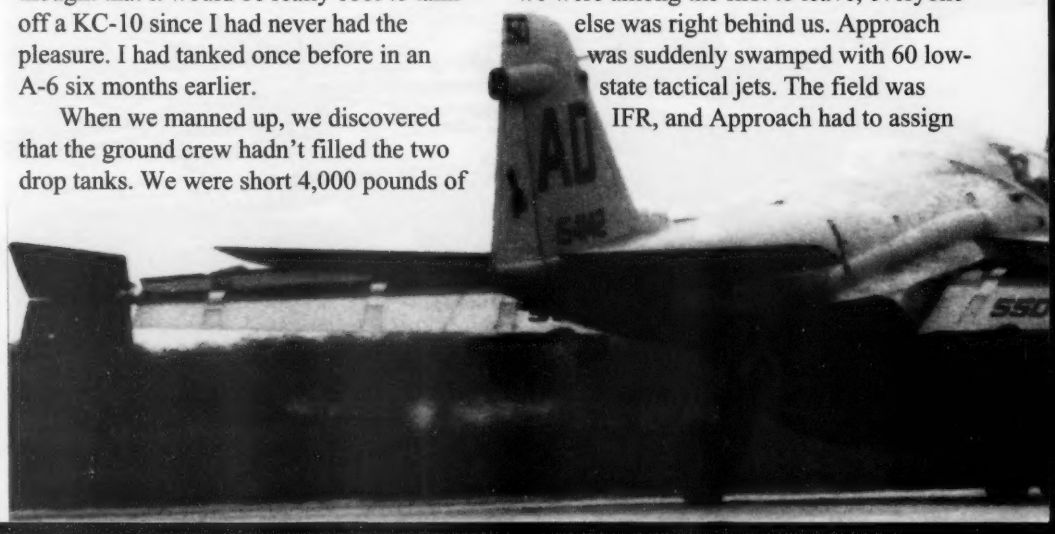
In the first event, Navy, Marine and international forces opposed the Air Force. In the brief, we found out that we had the element lead with two F-14s as our attached TARCAP. We stressed a VFR recovery because the weather was supposed to improve. Unlike our pointy-nose friends, the A-6 did not require tanking. I thought it was pretty cool that we didn't need gas to complete this hop. At the same time, I thought that it would be really cool to tank off a KC-10 since I had never had the pleasure. I had tanked once before in an A-6 six months earlier.

When we manned up, we discovered that the ground crew hadn't filled the two drop tanks. We were short 4,000 pounds of gas. After checking with maintenance, we found that it would take too long to get a fuel truck. Now, the lack of a tanker for A-6s didn't look so good.

We double-checked our fuel figures and decided that we would have enough gas to play, as long as we egressed early. We set a joker fuel and planned to stick to it. Our playmate went down in the chocks–lucky for him as it turned out.

After takeoff, we had time before the exercise, so we tried for some opportunity gas from the KC-10. After joining up, we saw quite a few of our friends waiting to get gas. By the time we could have plugged, it would have been too late to get to our rendezvous point before the exercise began.

The run was a high-altitude LGB delivery. We hit the target and escaped. After a quick egress, we headed to the exit point before all the big furballs ended. The plan called for the divisions to exit and fly the stereo routing back to Mugu. Although we were among the first to leave, everyone else was right behind us. Approach was suddenly swamped with 60 low-state tactical jets. The field was IFR, and Approach had to assign



holding altitudes, then break up the divisions for IFR penetrations. We had arrived overhead with 2,500 pounds above our bingo to the nearest divert, which made us feel pretty good.

After about 15 minutes of waiting and dodging airplanes, we were down to 1,400 pounds above bingo. We decided to remind Approach that we were still there. To say that the frequency was clobbered would be a major understatement. When we finally got through, they told us to go to the recovery tanker. No problem. All we had to do was find it.

Actually, we found the tanker easily since it had eight thirsty jets clustered around it. My BN double-checked the bingo numbers, profiles, and weather at possible diverts. Everyone was nice. We were all comparing fuel states and figuring who should go next. By now, we were 300 pounds above bingo. After a guy that was 100 pounds above bingo got gas, they cleared us in.

Three desperate stabs at the basket was all it took to drop us to bingo. We started our profile, squawked, and called Center. Passing FL 180, Center told us Mugu would take us now. Since our profile took us right over the field, we came off our profile and called Approach. We were committed to landing, and the next five minutes felt like hours as we descended for the approach. We broke out at 400 feet in rain showers and landed. Twenty other jets had to divert. The next event went more smoothly and included a recovery plan with the current weather.

Always brief a weather backup plan for large strikes: divisions split-up, section approaches, separation on final, and additional recovery tankers.

Never take fuel for granted. Set a bingo number and live by it. Consider such things as weather, other aircraft, aircraft malfunctions, and pilot proficiency.

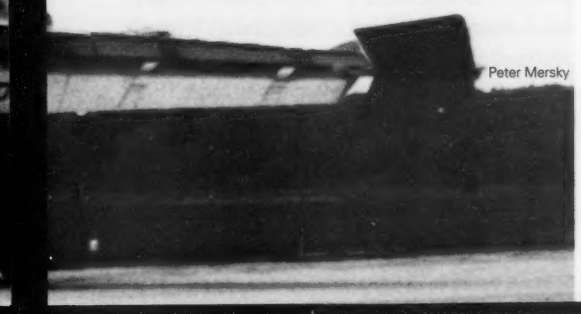
We like to think we can do anything, and nobody likes to admit they can't. Asking Approach for clearance to hold longer at maximum endurance instead of chasing a tanker with our low fuel would probably have been smarter.

Any hop will go more smoothly, you'll avoid surprises, and you will improve your ability to handle problems if you plan your flight.◀

Lt. Vanlobensels flies with VA-95.

P.S. from the safety officer: When you begin your bingo profile, stay with it until you land. This crew was lucky that nothing else complicated their dilemma after they discontinued their bingo.

Three desperate stabs at the basket was all it took to drop us to bingo.



Peter Mersky

Mr. Toad's Wild Ride

It is a normal day for our UH-3H VIP Det. We fly passengers from the ship to the helo pad at the naval station, drop them off, then head for home. We are only 14 miles northwest of the field...

by LCdr. Rick Dolan and Lt. Eugene Chan

PHC Johnny R. Wilson

A quick approach and we can call it a day. Current ATIS: 1735L, wind 020 at 10, ceiling 800 feet overcast, visibility 1,500 meters with rainshowers, runway 01 in use, altimeter 30.03. I'm in the left seat, but tonight is a good night for the "old guy" to log an approach. I set the cockpit up for the NAF ILS. After takeoff, we remain VFR over the harbor. I contact Approach for an IFR pick-up to a PAR full-stop.

Approach clears us, "Squawk 5211, climb and maintain 4,000 on present heading."

We comply and enter the clouds at 700 feet, heading 340. It's thick, dark, cold, and raining moderately. I include the OAT in one scan. It won't be a problem. We level at 4,000 feet and without delay, Approach turns me left to 240 and hands me off to NAF GCA. I call for landing checks. My copilot, backed up by our crew chief, does the checks. Then GCA turns me right to 300 for sequencing and clears me to 1,500 feet.

I report leaving 4,000 feet and start my turn. Descending through 3,500 feet, the aircraft lurches, and a bright light illuminates the cockpit, followed by electrical arcing and smoke. We have an electrical fire.

The automatic stabilization equipment (ASE) has failed, and my attitude gyro is laying on its side with the OFF-flag showing. My copilot's gyro is the same. The rest of my last normal scan on this leg reveals that I have lost my gyro compass. All my panel lights are flashing. My copilot has his flashlight out, but it's flickering at best. The crew chief has the fire extinguisher ready, but we can't isolate the fire. The circuit breakers pop and isolate the fire for us. It's all compressed into one fateful moment and now we're on a circus ride.

I call Approach and declare our emergency. I'm assessing as I report the status of our equipment. I think, "Ball is out. Keep it centered. Maintain 70 knots. Keep the needle straight." Controller tapes later indicate it has been approximately 11 seconds since things started going wrong.

Our NAF controller offers a partial-panel GCA and I accept, feeling that I should be able to do it if I can just fly level long enough to get my bearing. After all, I have a needle, ball, airspeed, torque, and VSI, right? My training forces me to believe the gauges. Yet, I feel the attitude excursions are getting larger and larger.

The turn needle is straight up. It isn't moving. Everything else is. The crew chief in his gunners belt is alternately pinned against opposite sides of the aircraft. My copilot's head bobs fore and aft. He later reports seeing me pulled out of my seat to the limits of my harness.

I try making small, deliberate control inputs as I scan the gauges I have left. The turn needle is dead. Without it, we have no way of knowing our attitude. I set 55 percent torque and try to stay in that range.

It's black outside the cockpit. I feel lateral accelerations or uncoordinated rolls in my seat. I try to center the ball. It comes in, but not to center. It's diverging. I know it. Another cycle, then Approach asks me to maintain present heading. I ask them to stand by. The instruments show we're at 1,900 feet and 70 knots, with a centered ball. It's transient. The airspeed needle is racing toward VNE. The aircraft is over on it's side, but which side? The VSI shows a 4,500-plus fpm descent rate. I think, "This won't last much longer."

A dim light penetrates the darkness outside the cockpit. My aircrewman calls it out. It is a small hole at best, a layer between clouds. I see a line of distant lights that extend from top left in my wind screen down to the wet compass on the center glareshield. If the lights are on the ground then we are near 45 degrees left-wing down. If not, oh, well. I'm out of options. I push the stick right. The airspeed was already slowing from my last correction.

Our descent stops almost immediately. I call Approach and fly to the lights. Ground radar provides obstacle clearance. We maintain VMC and clean up the cockpit with the checklist en route. Two minutes and 25 seconds after it started, our wild ride is over, but we are still flying. We won't get any of our equipment back. The failure was permanent. The lights are on the beach 10 miles south of NAF.

We make our way west over the beach, occasionally as low as 150 feet AGL to avoid clouds. I follow the route of VFR course rules into the field. We discuss the possibility of landing short of our destination, but I am familiar with the terrain, wires, and obstacles, and the route doesn't overfly any residential areas. I fly cautiously at 40 knots, with the searchlight on as the entire crew keeps a sharp eye out for obstacles. We pass over the highest wires with an uncomfortable margin from the ceiling. Approach is giving us our position from the field and track. I pick up the approach lights inside a mile, make an uneventful landing and shut down.

Water accumulating in our ASE-channel monitor panel probably caused the electrical fire. Power surges opened fuses in the ASE amplifier, turn-rate gyro system, yaw-rate amplitude demodulator, and popped the No. 2 lighting circuit breaker. The main cannon plug for the ASE-channel monitor panel was missing three pins, and the heat from the arcing had damaged the remaining pins. Maintenance confirmed there was nothing we could have done in flight to regain use of any of those systems.

We regularly check the components mounted under the pilot and copilot windows for water. Did we use all of our options during this emergency? Perhaps not. But we can analyze our conduct in the comfort of the ready room trying to identify what else we might have done.

Look closely at redundant systems that share common components and beware. Everyone has practiced ASE-OFF partial panel back in the training command and thought, "This will never really happen."◄

LCdr. Dolan and Lt. Chan fly with HSL-51.

The turn needle is dead, Without it, we have no way of knowing our attitude. It's black outside the cockpit...

What Color is a Hook

I climbed out of my stricken jet and thought, "What am I getting into?"

I was a nugget, fresh out of the FRS, drafted to a squadron that had just fallen flat on its collective face. I arrived the same day as the interim skipper, who was sent to straighten out the screwed-up program. In just 10 days we were going on RIMPAC and we didn't have one up jet. Things were so bad that we were borrowing jets from the FRS for FCLP.

I thought, "What am I getting myself into?" I was used to flying brand new jets at the FRS. I had only seen about five caution lights in the last year, let alone had a major emergency, but that was about to change rapidly.

My culture shock began during my one chance to bounce our only boat-configured (tanks and rails) jet. Five minutes into the flight, my VDI failed. My night partial-panel approach and landing were OK until I checked my brakes at 80 knots and found I had none.

Passing the 7-board, I remembered to de-select anti-skid and immediately blew the left main tire. As I climbed out of my stricken jet (sitting forlornly at the 5-board), I again thought, "What am I getting into?"

Miraculously, maintenance produced six up machines for the fly-on, and I felt both excitement and anxiety when I saw my name on the flight schedule. I was part of a two-plane, flying as wingman for the CAG ops officer. Things went smoothly until the Air Boss called us down from high holding, and that's when the dominoes started to tumble.

Just as I noticed my lead start to dump toward max trap, my master caution light illuminated. I glanced at my caution-advisory panel to find my pitch computer had kicked off-line. I pushed the master reset and then selected dump, like my lead. Master reset did nothing to the two pitch lights, so I felt down to the circuit-breaker panel and cycled the pitch-computer circuit breaker, hoping that would fix the problem.

All the while I was flying form, monitoring my gas, and talking to my RIO about landing without outboard spoilers at the ship (the pitch computer commands the outboard spoilers in a Tomcat). The circuit breaker drill worked (or so I thought), and everything was hunky-dory again.

I still had about 1,000 pounds to dump as we approached point 3 in our final descent toward the pattern. That's when the pesky pitch computer decided to kick off-line again. Instead of telling my lead that I had a problem and was going to detach and check it out, I decided to hack it. I was a fleet guy now, I could handle it. I felt down and cycled the pitch computer CB again, and this time the lights remained on.

I was flying form, putting my wings to 68 degrees, recycling CBs, and most of all, not monitoring my gas. As we approached the initial, the master-caution light flashed on again, and when I looked down my heart jumped in my throat. "Bingo" was illuminated, and when I glanced back at the fuel gauge I couldn't believe I was looking at 3.9. I had dumped all the way down to the standpipe, which stops you from dumping past 4.0, thank goodness. The ship was 120 miles west of the nearest divert and I was 400 pounds above bingo. That's when I made my biggest mistake of the day. I said to myself, "I'm going to land this bird on the first pass!"

My RIO wasn't too happy about being 400 pounds above bingo or letting his nugget pilot put him in a box, but I was

Slap, Paddles?

by LCdr. J.P. Easterbrooks

going to redeem myself by getting on deck and ending this ordeal.

Into the break we went, and I concentrated on reaching the perfect abeam position right at 1.2 miles, on speed. I hit the abeam right on target and began my approach turn at the 180. Things started to go wrong at the 135, when I felt wide and let my angle of bank out. Of course, this made me overshoot, and while trying to correct, I wrapped up the jet and got overpowered. As my RIO called the ball with a 3.7 state, and Tower asked why we were at bingo plus 1 on our first pass, I tried to correct for my high, fast, lined-up-right start and made a large left-wing-down correction together with a large power reduction. I didn't recorrect until the ball started to descend from the top of the lens. Bad mistake!

The first call by the controlling LSO was, "Power, power, wave off, wave off!"

I shoved the throttles to military at the first power call, but the engines had spooled down for almost two seconds, and TF-30s take time to spool back up. While I was waiting for the engines to provide power and not just noise, I watched the ball settle off the bottom—yes, it can go off the bottom—of the lens. I was now in close, a little lined up left, and staring right at the ramp. By this point the back-up LSO had chimed in with "Wave off, wave off!"

The TF-30s finally provided power and we were climbing when we reached the ramp, crossed it, then felt a small bump. Our tires only rolled about 75 feet before our Tomcat became airborne again, well before the 1-wire. The Boss calmly said, "116, you just had a hook slap, your signal is Bingo, gear up, hook down until checked, your steer is 060 for 120."

It happened all within 15 seconds, in the blink of an eye. I asked my RIO if he believed what had just happened, and all he said was, "Let's get this jet to the beach."

A tanker chased us down, and I got some day plugging practice too, then diverted to our home field. Maintenance checked the hook, found no damage, and changed the pitch computer. The SDO reported the ship had not called asking to keep me on the beach, so we hot re-fueled went right back out, checked in, got called down, and flew a fair pass. I then got yelled at by everyone from the Air Boss on down—and rightly so.

What did I learn from this harrowing experience? First, even if you're new, trust your instincts and NATOPS. If it doesn't feel right, it probably isn't. Second, it's really not "better to die than look bad." Third, and foremost, never say, "I have to land this pass! " That attitude let me make a gross correction I normally never would have made.

LCdr. Easterbrooks now flies with VF-211.

"Bingo" was illuminated and I had dumped all the way down to the standpipe.

PH1 Michael D.P. Flynn.

"I Taste Bile"

The lights got no brighter but we had to be getting closer.

My copilot made his comment as we approached the stern of our LPD. It was the toughest approach I had ever made to a ship—a ship at rest, in calm water, with negligible winds.

Working up for the Gulf War, we had been practicing night missile-launch profiles and tactical maneuvering. Smoke from oil fires had combined with moisture-rich air to form a horizonless haze. Because of the glassy water, the sea and sky were exactly the same color. Up, down, fore and aft, everywhere was featureless and dark.

Four Cobras were parked on the aft spot of the LPD, leaving just the forward spot to land on. After the mission, we motored in slowly for the break. The lights of the ship hovered, suspended in the darkness like a space station. We turned across the bow. Faced away from the ship, we were completely blind. There was literally nothing in the world we could use to orient ourselves, except the instruments.

Coming out of the left turn, I was too high, couldn't judge closure rate or rate of descent from the ship's lights, and couldn't fly by looking at the deck and the instruments at the same time.

I waved off, knowing that I had blown one chance to land. More than that, I also felt that no approach I flew that night would be successful. I passed the controls to the front seat as we made the right turn to get in the pattern aft of the ship. The front seat of the Cobra has better outside visibility, though there was nothing to see but lights suspended in space behind us.

I hoped that my copilot would do the visual flying while I gave him information from the instruments. I also tried to sound as casual and collected as possible, to foster a sense of confidence and calm. That's when the copilot, ever the honest guy, said, "I taste bile."

His body was reacting to the truth of the situation—that we were in serious trouble. Though my body was prepared to race into the panic mode, I felt I could submerge the feeling for one more approach. We descended from 200 feet and turned right to try to find some lights to line up on. I called out the heading and told him when to stop the turn. There were lights in front of us, but it didn't look like we were getting any closer to them. Airspeed read zero. The radar altimeter read 100 feet, 50 feet, 20 feet.

I gently pulled a little pitch to stop us at 20 feet. No big yank of power, we couldn't afford to wave off. The lights got no brighter but we had to be getting closer. If we had been hovering at 20 feet, we would have kicked up a typhoon of salt water spray, which would have been sucked down through the main rotor to rain down on the cockpit windshield. As a fine mist, it would almost instantly dry on our warm windshield, and in a matter of a few moments, we'd have a frosted window.

by Maj. Peyton DeHart, USMCR

The salt crystals would sparkle like sugar. We wouldn't see through them, and we couldn't clean them off. A glance to my right confirmed we were moving forward. The glow from the dim green position light on our stub wing reflected off an indistinct cloud of salt spray that was just behind us. We were flying just slightly faster than it was being kicked up. I wanted to be slow, and the airspeed gauge doesn't work at low speed, so the fuzzy pillar of spray would have to be my airspeed cue. As long as it was behind us, we were going forward. That was fine, but it was chasing us; we couldn't stop.

"Good airspeed. Come up 10 feet. Then we'll be level with the deck," I said to my copilot.

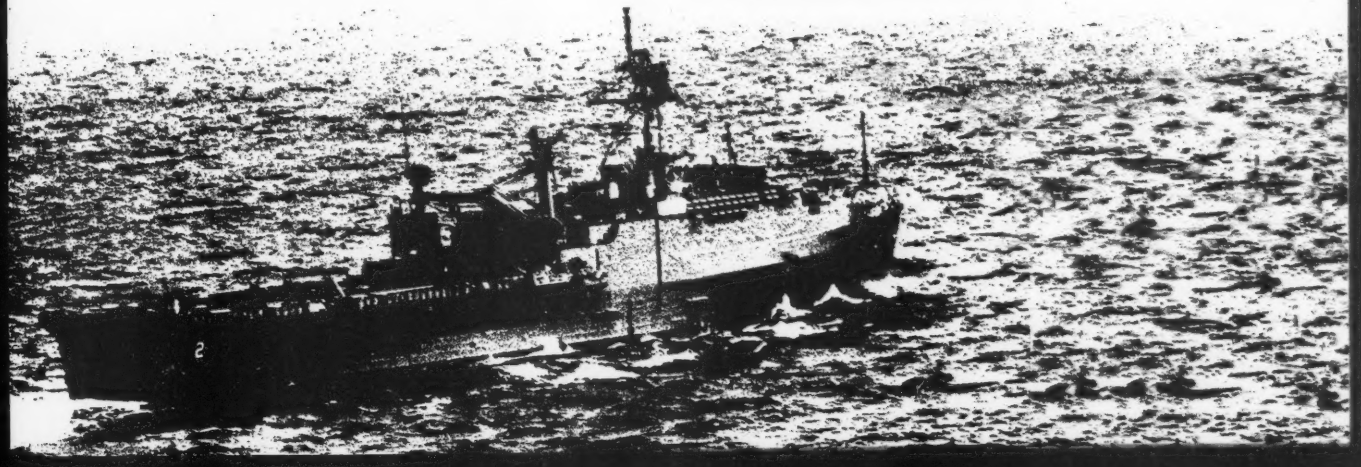
We rose slightly.

"Good airspeed and 30 feet."

I talked the whole way in until we got so close that we could tell closure rate from the movement of the ship's lights. Slowly, slowly, slowly we crept along. I maintained my instrument scan until he planted us on the deck.

Tower asked if we were ready to lift for another bounce, and I assured him that the aircraft was done for the night. It took the best the two of us had that evening to land upright on a hard deck. I'm glad our crew coordination paid off, or we'd have washed the bile out of the back of our throats with salt water. ➤

Maj. DeHart is a frequent contributor to *Approach*. He flies with HMLA-773.



Brow

and Goggles

by Lt. Jo

The HAC took the controls, announced that he still had visual...

While going through the CSAR ground-school syllabus, I got a demonstration of how inadvertent IMC flight can quickly get you in a lot of trouble, especially while on NVGs. I thought that you'd have to be pretty stupid to fly into the clouds while on goggles. I recently discovered that brownout, caused by rotor downwash, will cause the same conditions with predictable results.

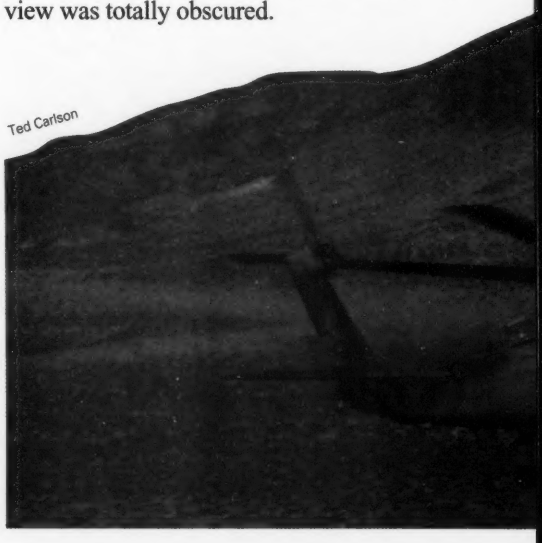
I was scheduled to fly with one of the squadron's senior pilots on an NVG training flight. Half of Southern California was ablaze with forest fires. Visibility was marginal during our flight through the mountains, so we decided to keep our altitudes a little higher than usual. The low-level portion of the flight went fine, and we arrived at an abandoned field east of El Centro for some bouncing.

We started off with a few normal approaches to the runway, followed by no-hovers. We had been flying together for the past couple of nights, so this introductory stuff had almost become routine. It was time to move on to the more challenging work in several unprepared landing zones located between the two paved runways.

The HAC shot a nice CAL (confined area landing) approach to one of the larger LZs, which was nothing more than a washed-out depression surrounded by six-to-eight-foot desert scrub. He lifted from the zone, and I repeated the maneuver back to the same LZ. Then, we decided to sidestep to a smaller LZ with a more sandy surface.

I took the controls and set myself up for another CAL approach. As we crossed the edge of the LZ at 35 feet, with a 10-knot creep, my crewman called the tailwheel clear. I stopped my forward drift and stabilized over the zone. Both crewmen cleared the aircraft to descend, and I lowered the collective. Everything was fine until around 25 feet, where we encountered brownout. We didn't detect the rapid onset of IMC until it was too late. Almost immediately, I lost all visual reference with the ground and the horizon, and I called, "Waving off."

At the same instant, the HAC took the controls, announced that he still had visual reference with the ground, and wanted to land. Both crewmen reported that they still could see the ground from their stations. At this point, I went on an IFR scan because my view was totally obscured.

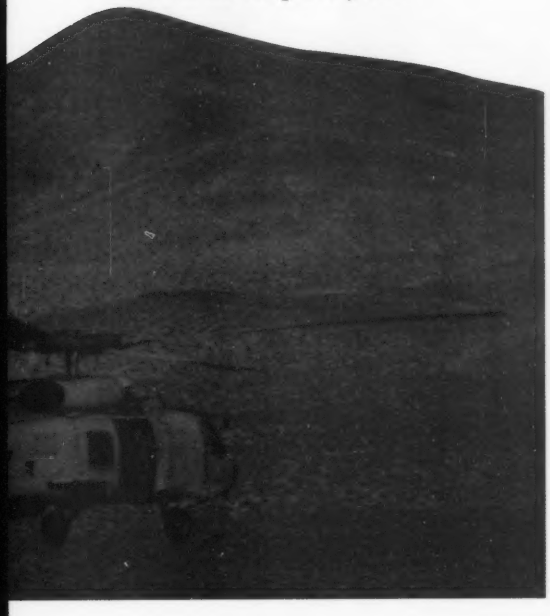


Ted Carlson

nout
Don't Mix

ischeri

I began calling altitudes off the radar altimeter as we continued our descent. Passing through 10 feet, the crewman in the aft station called us drifting back and right in a hurry. I came up on ICS and recommended a waveoff. In the split second it took me to say that, then scan the attitude gyro, we had gone from a level attitude to 10 degrees left-wing down with 15 degrees nose low! Did I also mention we were at 15 feet AGL on the radar altimeter? I jumped on the controls, and told the HAC that I had the aircraft. I waved off, simultaneously leveling the wings and nose while pulling in a healthy amount of collective. At that moment, I was grateful for all that instrument training I'd had the last couple of years.



As quickly as we had entered the brownout, we were suddenly clear passing through about 40 feet. I took a deep breath, announced that my fun meter was pegged, and turned us west toward home. This marked the first time in my career that I had taken the aircraft from someone; for the HAC, this was the first time he had ever had an aircraft taken away from him.

We discussed the incident on the way home and came up with some conclusions, which we briefed to our wardroom.

In the first place, we probably should have shot a no-hover landing into the LZ because of the sandy surface. The standard CAL procedures I learned in the CSAR school work great in Jacksonville where the LZs are surrounded by 30-foot scrub pine, and the surface is hard-packed. However, doing a high hover to a vertical landing in desert conditions is not too smart.

The second lesson we learned that night is that if the pilot at the controls calls for a waveoff, it is in everyone's best interest to do it. It isn't worth taking a chance on balling up an aircraft to push the training envelope.

Finally, we discovered how unexpected IMC, such as brownout, can cause a quick degradation in NVGs. I know that I would never have flown without goggles that night because of the greater visibility they offered, but it just goes to show you that there are limits to what they can do for you. Remember, if you are stupid before you put goggles on, you will still be stupid with them on. ◄

Lt. Bischeri flew the SH-3H, and now flies the SH-60F, with HS-14.

I jumped on the controls, and told the HAC that I had the aircraft.

NFO Sc

by LCdr. Jay Hudson

I knew we had to eject by 200 feet to get everyone out in time...

Rick Llinares

It was my fifth CQ det as an FRS instructor, and I was confident that I could take a new EA-6B pilot to the boat and help him get his traps. The LSOs had been having some minor problems with this pilot and crewed me with him because I was the most experienced ECMO on the det. The weather was really nice, a change from the normal SOCAL scud layer, and I was looking forward to the hop.

We did a complete crew brief, covering all emergencies and normal landing-pattern numbers. The launch from Miramar went very smoothly, and soon we were orbiting in high-holding. The Boss kept us overhead for only a half-hour before we heard, "All Prowlers, Charlie, expect hook up." This had given my pilot enough time to get comfortable but not so much time that he would be tired when we

an Breakdown

went out that night. We discussed our gas, and dumped enough to be max trap after our two touch-and-goes as we spiraled down to enter the break.

There were only minor deviations during the two touch-and-goes, and I was beginning to feel good about my pilot and his abilities. The call came: "Hook down, 904." I rogered the call. During this time the pilot had been concentrating on getting a good interval and turning, so I waited until we were established on the downwind leg at 600 feet before reminding him about the hook.

I was trying to keep track of the aircraft in the pattern, so my scan was mainly outside. I still hadn't heard him confirm hook down. I reminded him again and this time, looked inside to see him pull the hook-release lever. I saw his hand momentarily leave the stick twice, going for the hook release, and then grab the stick again. Now, I was curious. I got real interested when I saw him now take his left hand and reach across his body trying to pull the handle. My scan had totally broken down by that point, staring at the contortionist in the left seat.

What didn't register at first was that for his left arm to reach, something had to be moved out of the way. That something turned out to be the stick. For some reason my eyes flickered over at the pressure altimeter. It was passing 400 feet, going down quickly.

Time compression took on a new meaning for me during the next few seconds. I remember yelling, "Pull up, pull up!" on the ICS as I checked the VSI, seeing a 1500-fpm descent rate. At that rate, I knew we had to eject by 200 feet to get everyone out in time and checked my lower ejection handle. The VSI started breaking, and we bottomed out at 175 feet on the radar altimeter. I still sometimes wonder why I didn't pull the handle.

We climbed back up to the correct altitude and continued the approach. Rather weakly, I said I would take care of the hook for the rest of the hop. I hadn't heard a sound from the student in the rear cockpit during this entire goat-rope. When we finished our day work and were finally parked and chocked, the head Prowler LSO came looking for me. He was almost as pale as I still was and asked if we hadn't heard the Boss yelling to us about our altitude. I hadn't; the ICS tends to override the radios when someone is screaming on it.

I learned three valuable lessons that day. First, just because it is a beautiful day, and the pilot is doing well, an NFO still can't get blasé about his copilot duties. Second, I started to impress upon the rear-seaters the importance of the numbers when flying around the boat. I had always briefed them concerning boat ops, but from then on, I really started talking about the importance of backing up the front seat and calling deviations.

Lastly, NFOs need to keep their scan going, during all missions. There is always a lot of discussion directed toward the pilots about scanning, but not so much directed toward NFOs. Remember, your pilot can be distracted by such a small item as how to pull the hook when the aircraft isn't properly trimmed, and that's one reason an NFO is in the aircraft. ◄

LCdr. Hudson flies with VAQ-131.

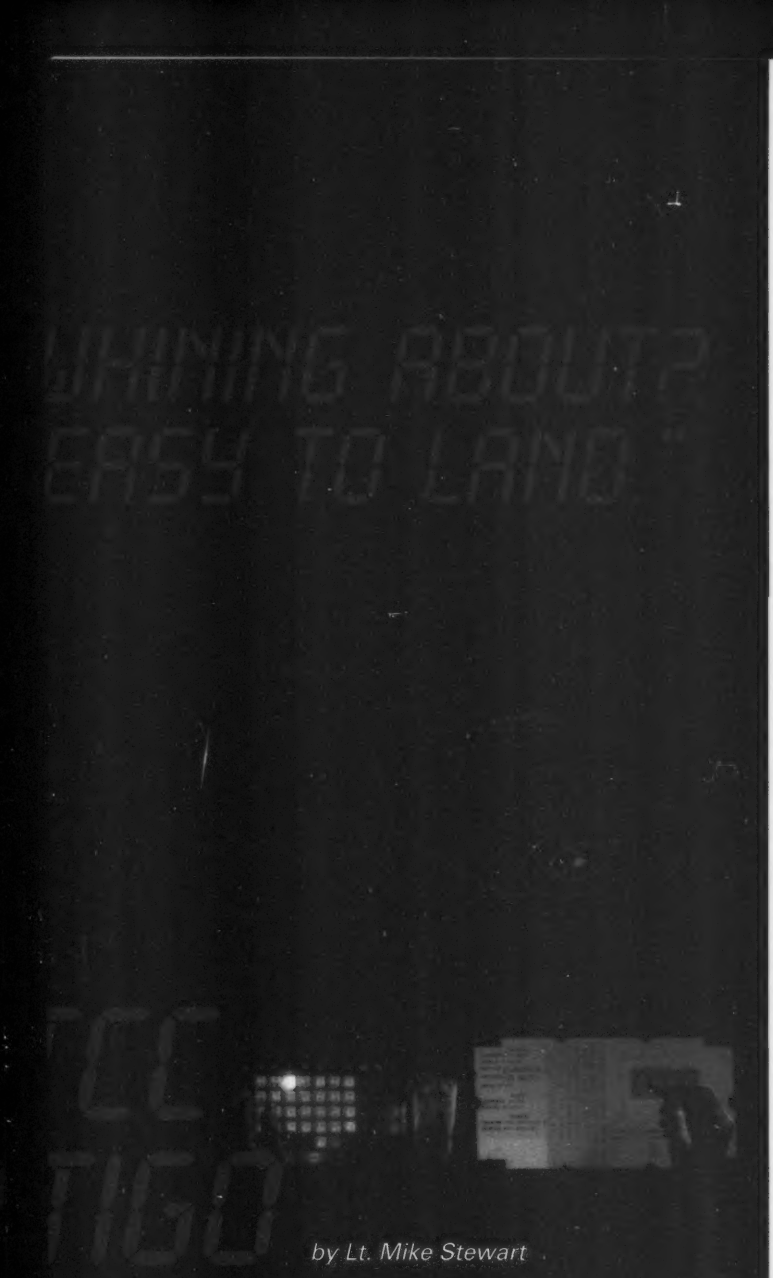
With two-and-a-half cruises under my belt, I find that CATCC controllers are usually receptive to constructive criticism. Normally, they are always working to be the best they can be. But there is one thing that I can't understand: CATCC's approach to vertigo.

It frustrated me when the CATCC controllers would bring me out of overhead holding, have me descend and turn, and then dirty me up IMC. Since I was flying the tanker, I would start at 6,000 feet, then CATCC would tell me fly the downwind and descend. At about five or six miles, while I was descending, they would turn me to base, then to final. Invariably, because the controller was making space ahead of me, he would not hook me, and I would overshoot the final by at least 25 degrees. Then he would hook me back to the left to intercept the final bearing. Next he would hold me at 2,000 feet, then quickly bring me down to 1,200 feet at four miles.

Later, in CATCC, when I explained to the controller that this was highly disorienting, he would look at me as if to say, "What are you whining about? Your plane is easy to land." He would explain that the Captain did not want to wait for the tanker on a long straight-in. In fact, a CATCC officer once told me, "I only have to get you through the final gate at three miles and 1,200 feet." I guess that implied that he wasn't concerned about how he got me there.

This attitude used to frustrate me: no one seemed to consider that all this turning and descending, while in the goo, could give me a nasty case of vertigo. Trying to land on a carrier while experiencing vertigo is not a good thing. I am not saying that pilots will never get vertigo, but at times it seems that CATCC almost goes out of their way to give vertigo-inducing turns to pilots.

One day, we invited the CATCC folks down to a ready room full of A-6 and S-3 tanker pilots to discuss tanking. In the middle of this meeting, one of the other pilots brought up the point of shortened straight-ins and quick descents. The CATCC



by Lt. Mike Stewart

PH3 Daniel G. Lavoie

Officer gave his standard answer: "I only have to get you through the final gate at three miles and 1,200 feet." There was practically a riot. Granted, things improved a bit, but it always struck me that CATCC did not get it.

Flying circles overhead for two hours in night IMC can set up a pilot for vertigo. Making him descend quickly, hooking him, and dirtying him up while still in the descent only exacerbates that. CATCC should consider that vertigo is highly disorientating, and both pilots and controllers should do as much as they can to minimize it.

My suggestion is that during periods of IMC, always ensure that turns are as level as possible, and that the pilots are told to dirty up while straight and level. Realize that it takes about 15-20 seconds to completely dirty up and stabilize, so make sure that the pilot is straight and level for at least the time it takes to dirty up.

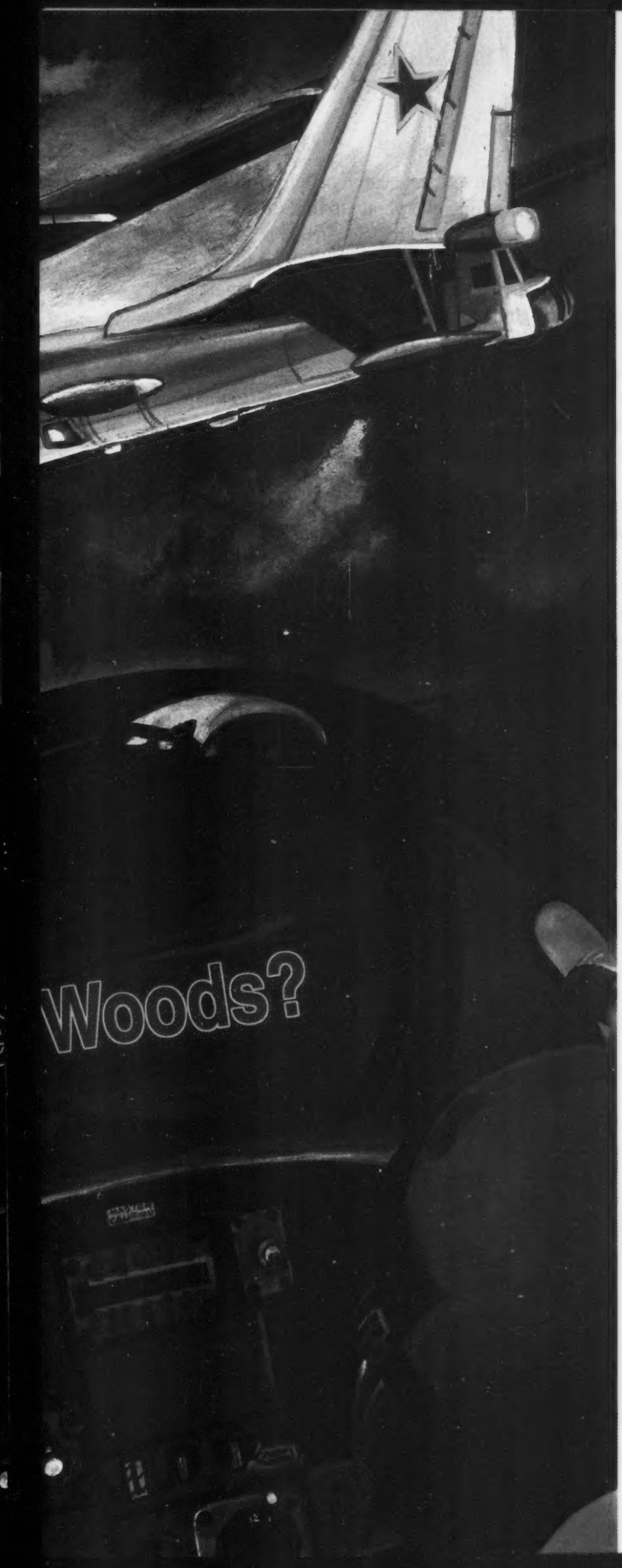
Lastly, the three-mile straight-in "final gate" should be the absolute minimum given to a pilot and as a last resort, not as the preferred approach. A six-mile straight-in makes a world of difference, because it gives the pilot three miles before he has to start descending.

I don't mean to sound negative about CATCC. They are usually very good. I have been helped on many instances by alert controllers. However, I have never understood why CATCC was so resistant to even considering that vertigo could be a problem. ◄

Lt. Stewart is an instructor pilot with VS-41. He has previously flown with VS-29.

The CV-NATOPS says that during IMC and night recovery, the duty tanker on its initial pass "shall be level during the turn to final bearing and given sufficient clearance to pass through six miles at 1,200 feet." However, recovery order is normally driven by deck space available for parking the recovery aircraft. Thus, CATCC follows the recovery order from the Air Boss. The sequence is usually the duty tanker between the last aircraft in the recovery and the Hummer. (The E-2 is almost always dead last.)—Ed.

Do Bears Fly in the



We had been standing the Alert-60 KA-6D watch all night, but the fun started around 0600, when the 1MC made its first faint announcement (how come these things never work in staterooms?): "Now launch the Alert 5 Tomcat. Initial vector 350."

Hmmm-m… Let's see, the Alert 5 just launched, so I guess that now makes us the Alert 30 tanker. No big deal. What are the chances of them needing gas in the next two hours?

"Now launch the Alert 15 Tomcat. Initial vector 350."

Uh, oh. That's two down, and it's only 0605. I'll bet those fighter guys are really hating life. I wonder how the weather looks on the PLAT… wonderful. Low ceilings, no horizon and rain.

Now launch the Alert 15 KA-6D."

Hey, wait a minute! They can't do that! It's only 0610, and we've shifted from the in-the-rack Alert 60 to the in-the air Alert 15 in just 10 minutes, and on a day with really bad weather, too!

Anyone who thinks the Three Stooges are retired has never seen two sleepy aviators try to get out of their racks and into their dry suits in less than two minutes. It can be done, but it ain't easy. Now, it's up to the ready room to get the launch information from CVIC and the latest SINS data for the Omega, just on the off chance that we can get the thing to work. It rarely does this far north.

Did the CVIC TV really say that we're EMCON A?

Flight gear on, run to the flight deck, quick preflight and it's time for engine start. It's a good thing that you can Indy-start a KA-6D, because that's the only way we're going to make this launch on time. I wonder why the yellowshirt isn't using the mouse to call us up and ready. Oh, yeah, we're EMCON A.

Out of the chocks, straight to the shuttle, and off the pointy end; into the air and into the goo at 450 feet (at least we made it in 15 minutes). Then comes the fun part: an IFR EMCON A departure with no inertial (KA-6Ds are Omega-only). Looks like time-distance-heading all day today. Time to think about the mission.

"So, where are we going?" I ask my BN.

"I thought you knew! I suppose we could try going out the Alert-Tomcat initial vector and see what happens. We'll call the E-2 and see where they want us."

After we fly what we estimate to be the prescribed departure, we start climbing and calling the E-2 for vectors to station. They give us a heading to the north for around 150 miles and an altitude of 25,000 feet to meet the Tomcats. Climbing through 18,000 feet, we are still IFR. We break out at about 21K and proceed out to meet our customers. We get a tally on the Tomcats at 30 to 40 miles, not because of our great eyesight, but because of the two Bear Ds that they're escorting. So, this is what all the excitement was about! We join up at the end of the train of aircraft wandering around above the undercast.

"515, say your give."

"Say our recovery time."

"Expect a ready deck."

"515 has 12.0 to give." Gotta look out for our Tomcat buddies.

"Give 6.0 apiece and RTB."

The first Tomcat gets his gas with no problems and swaps out with his wingman for escort duties. Now, nobody has ever accused Bear drivers of being idiots. As soon as the Tomcats swap out and Dash 2 is in the basket, both Bears split and dive for the deck. Our customer gets what gas he can and takes off in hot pursuit. Now we have a KA-6D alone and unafraid, without a radar or TACAN.

"515 is complete. RTB. Looking for a vector to mom."

"Stand by, 515. Looking."

My BN, always a little sarcastic, says, "I wonder if he's looking for us or mom."

"Roger, radar contact. Take heading of 170. Mom should be on your nose for 80 miles. EMCON recovery. Cleared to descend."

Passing 5,000, still in the goo. Same with 4K and 3K. Now the pucker factor is starting to increase. We decide to step down in 500-foot increments until we break out. At around 500 feet, we start to reach the ragged bottoms of the cloud deck. We have to work hard on keeping clear of clouds and finding mom. Why are we still in EMCON?

We fly our vector, with occasional updates from the E-2, and what do we find but an AOR. Nice ship, but the deck's a little too short. The E-2 gives us a vector to another contact, which turns out to be a destroyer.

Time to try the old box-search pattern, while simultaneously telling everybody to turn on the TACAN and cancel EMCON. No such luck. We wander around our search sector looking for home, hearing the Tomcat in the background reporting that he still can't find the second Bear anywhere because of weather. After about 10 minutes, we are treated to one of the scariest sights an aviator can see: a large, four-engine bomber nose on, descending out of the clouds at less than a mile off our wing. It is huge, it does have eight counter-rotating props, and it misses us by about 100 feet.

My BN decides to call the E-2 after we dodge the aluminum cloud that tried to hit us.

"You guys got us on radar?"

"Affirm. We lost skin paint, but we have your parrot and India."

"Still looking for the Bear?"

"Affirm."

"Same place."

Once we realize we aren't dead, we make what was probably the best decision we had made so far: fly the reciprocal of the Bear's course and see what happens. Sure enough, after about 20 miles, we fly right over top of mom. We enter the break at 400 feet. What else could we do? Everything is still turned off, and the weather is 500 and 1 1/2. We then hear the first words in 1.5 hours from the ship.

"At the 180, you're low."

Fortunately, we get aboard on the first pass. While taxiing up to the bow, the TACAN comes back on line, and the Tomcats recover Case III.

We learned a lot of lessons that day. First, don't assume for a minute that you won't get launched on an alert. As soon as you think that, you're probably going. Second, even with a good DR plot, it is very easy to lose track of where you or the ship are. Third, if the weather prevents certain operations, raise the flag. At no time did we have EMCON weather as defined in CV NATOPS. Never assume that you are under positive radar control, especially around the boat. Lastly, learn to trust your instincts when others are trying to put you in a box. Have a plan, and when that one gets trashed, have another. We got lucky, but things could have very easily gone the other way.

Lt. Maxwell was flying with VA-176 at the time of this story. He is now assigned to Strike Weapons and Tactics School, Atlantic.

Trap on a Foul Deck

by Lt. S.E. Trent

As an LSO, I spend more time on the flight deck than most aircrew, but much less than the maintenance and flight-deck crews. Even near the end of my first cruise, I was still wet behind the ears when it came to spending time on the roof. One night, I witnessed something that drove home the need for vigilance.

We were about halfway through a recovery during our transit back from the Persian Gulf. The deck was clear with a Tomcat at three-quarters of a mile. As the Tomcat crossed the ramp, the foul-deck light suddenly came on. Knowing that it was too late, I activated the waveoff lights and instructed the pilot to go around. This had little effect on the pass because the Tomcat was already over the ramp. The hook caught the two-wire on the fly and the Tomcat rolled out into the landing area.

Trapping on a foul deck usually triggers a mishap investigation. The deck goes foul when the deck officer determines that, for any number of reasons, it is not ready to recover aircraft: people or aircraft may be in the landing area, or the arresting gear may not be retracted or properly set.

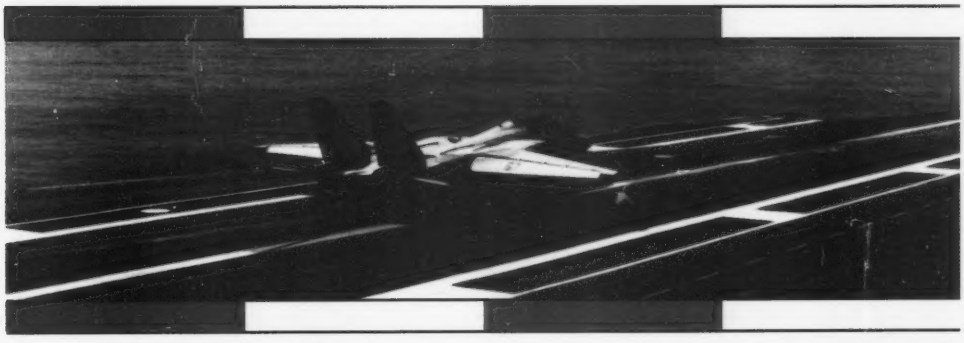
As I turned around to watch the Tomcat roll out, everything looked normal. And then I saw a body flopping around under the Tomcat's wing! After an initial feeling of horror, I dropped the radio and started to run up the flight deck. Much to my relief, the unfortunate soul picked himself up off the deck and limped out of the landing area, helped by a yellowshirt.

The victim turned out to be a COD aircrewman, who should have had more sense than to take a short cut across the landing area at night, without any hearing or eye protection, and without a float coat. If the Tomcat had caught the 4-wire, or had boltered, he might not have been able to walk off of the flight deck.

I now have three rules that I live by when I am on the deck during flight operations. First, if I do not need to be there, I go below. Second, if I am on the roof, I wear my safety equipment. If I can, I latch onto someone who knows their way around the deck. Third, and above all, I keep my head on a swivel and do not lose the situational awareness that my life depends on.◄

Lt. Trent is an LSO for VAQ-139.

Knowing it was too late, I activated the waveoff lights...



John W. Williams

Bravo Zulu

AW1 Brown and Lt. Kunka.

Lt. Robert Kunka
Lt. John Truetler
AW1 Carl Brown
HSL-49

The crew of Red Stinger 108 was conducting their annual NATOPS evaluation flight in the NAS North Island offshore training area. Setting up for the over-water portion, Lt. Kunka (HAC) slowed the aircraft so that AW1 Brown could hand-launch a marine location marker through the open cabin door. Immediately after opening the door, AW1 Brown reported a high-pitched whine that seemed to come from the No. 2 engine area.

Even though the pilots couldn't hear the noise, Lt. Kunka aborted the mission and turned toward shore. The noise grew louder, but the pilots could hear it only when the SENSO keyed his mike on ICS. The crew then confirmed that the noise increased when the pilot increased collective.

With these indications, Lt. Kunka declared an emergency. Lt. Treutler (copilot) completed the immediate-action emergency procedures for an impending high-speed shaft failure in the engine, applicable procedures for single-engine failure, and the landing-ditching checklist.

The crew made a single-engine profile to a running landing, and Lt. Treutler brought the No. 2 engine off-line as Lt. Kunka stopped the helo. AW1 Brown got out to inspect the aircraft and realized that the noise stopped when the No.2 engine was secured. Postflight inspection showed a fatigue stress fracture of one of the second-stage compressor blades.

AW2 Ladd, Ltjg. Willis, and Lt. Beadles.

Lt. Joe Beadles
Ltjg. Vince Willis
AW2 Kelly Ladd
HSL-37 Det 6

After a night launch from USS *Chosin* for a surface-surveillance mission in the North Arabian Gulf, the crew of Easyrider 61, an SH-60B, lost the hydraulic boost to the helicopter's flight controls.

Ltjg. Willis (PAC) reported the loss to the crew and started emergency procedures. After scanning the cockpit caution advisory panel, Lt. Beadles (HAC) took control and began a shallow turn back to the ship.

Ltjg. Willis radioed *Chosin* to reset flight quarters and broke out his NATOPS PCL. AW2 Ladd (aircrewman) provided radar vectors to set up the aircraft for final approach.

The crew saw the caution lights illuminate for the No. 2 hydraulics-reservoir low, the stability augmentation system, the automatic flight-control system, and the boost servo off. They correctly diagnosed the emergency as a pilot-assist servo leak.

With Ltjg. Willis and AW2 Ladd providing calls for altitude, range, and closure rate to the ship, Lt. Beadles shot a night, instrument, boost-off approach to a free-deck recovery into the 3-foot by 3-foot RAST.

Postflight inspection of the No.2 hydraulic pump revealed a malfunction in the reservoir low-level sensor, which caused the hydraulic leak detection system to shut off the aircraft's hydraulic boost.

Lt. Porter and Lt. Miller.

Lt. Jack Miller
Lt. Phillip Porter
VS-41

Lt. Miller (pilot) and Lt. Porter (COTAC) were flying a weather-reconnaissance mission in their S-3B. Thirty minutes into the mission, at 17,000 feet and 250 knots, they heard a high-pitched squeal, which was followed by a loud bang and explosive decompression on the COTAC's side. The COTAC's entire side canopy had blown out.

The crew immediately descended and ran through the EPs. They declared an emergency and began their 100-mile trip back to NAS North Island, which was IMC. North Island gave them vectors to a GCA. During the descent, Lt. Miller and Lt. Porter encountered a thick overcast and rain, breaking out at 300 feet and three-quarters of a mile. They continued the approach and made a field arrestment.

A check for damage showed that pieces of the canopy had dented several blades of the No. 2 engine fan and hit the starboard wing and horizontal stabilizer. The incident is under investigation.

(Back row) Lt. Tidwell, AD1 Pipes, Lt. Howell, AE3 Etzler, AE3 Allen, AD2 Sheil. (Front row) LCdr. Martin, AMH3 Strohl, and Lt. Varnes.

LCdr. Brad Martin
Lt. Brad Tidwell
AMH3 Eric Strohl
AE3 David Allen
Lt. David Varnes
Lt. Heath Howell
AD1 William Pipes
AD2 James Sheil
AE3 Ryan Etzler
HC-5 Det 5

Embarked in USNS *Spica*, Det 5's two HH-46D Sea Knights answered an urgent distress call from MV *Bismi*, which radioed that she was listing 20 degrees to port and taking on water in the South Arabian Gulf. Earlier, *Bismi* had encountered rough seas (7 on the Beaufort Scale). Barrels on the motor vessel's forecastle had broken loose, shearing sounding tubes on the port side of the ship, causing her to take on water.

Knightrider 13 launched with LCdr. Martin, Lt. Tidwell, AMH3 Strohl and AE3 Allen, prepared to hoist the crew off the stricken ship. As the first helicopter orbited the listing vessel, Knightrider 00 arrived, with Lt. Varnes, Lt. Howell, AD1 Pipes, AD2 Sheil and AE3 Etzler aboard. *Spica* also maneuvered alongside the motor vessel's windward side. *Bismi* tried to limp toward Ad Damnam main channel, 36 miles away.

Despite the crew's effort to jettison cargo, heavy seas and an excessive port list made *Bismi* unsteerable. Foundering in rough water, the motor vessel's list increased to 25 degrees to port. It took on more water and its deck was awash, with waves crashing over the port side. The crew began abandoning ship.

Ten to 12-foot seas and 35-knot winds made hoisting survivors from the ship impossible. With Knightrider 13 hovering nearby, the ship's crewmen donned life jackets and jumped from the port-side wheelhouse into the sea. SAR swimmers AE3 Allen, AE3 Etzler and AD1 Pipes were lowered from the helicopters to help rescue survivors.

An hour later, waves caved in the motor vessel's forward cargo hatch, and *Bismi* quickly flooded and sank. As the freighter rolled on its port beam and disappeared, Knightrider 00 hoisted AD1 Pipes and *Bismi*'s master, Capt. J. D'Souza, from the water. AD1 Pipes retrieved six of the 12 survivors, with Petty Officers Allen and Etzler making four and two rescues, respectively.

BZs require an endorsement from the nominating squadron's CO *and* the appropriate CAG, wing commander, or MAG commander. In the case of helo dets, the CO of the ship will suffice. A 5-by-7-inch photo of the crew by a squadron aircraft should also accompany the BZ nomination. Please include a squadron telephone number so that we can call with questions.

Bravo Zulu

AN Bob Garcia
HSL-48, Det 2

AN Garcia was the final checker for his det's SH-60B aboard USS *McInerney*. Just before launch he saw a film of hydraulic fluid on the tail of the helicopter.

He checked and found hydraulic fluid leaking from the first and second stage of the tail-rotor servo actuators. Had the aircrew taken the Seahawk, the tail-rotor servo would have lost all of the fluid 170 nm from the nearest airfield.◀

AE2 William Schedule
VAW-117

During a QA preflight of an E-2C aboard USS *Abraham Lincoln*, AE2 Schedule noted excessive play in the upper-outboard starboard rudder.

He checked it and found that the upper attachment point in the rudder assembly was missing a bushing. The bolt had been wearing against the rudder assembly, damaging the bolt.

AE2 Schedule's timely discovery prevented a possible flight-control malfunction that could have led to a mishap.◀

AN Darrell Smith
HSL-48

Airman Smith found a discrepancy in a main-rotor scissors bearing while doing an SH-60B turnaround check during a demanding FLEETEX.

After removing and inspecting the bearing, mechs found that the bearing had seized. AN Smith's unusual find prevented a possible mishap.◀

AN Ken Hutton
VF-102

During a preflight inspection of the starboard engine intake on an F-14B, AN Hutton saw the interwall of the intake move. He pressed the interwall and thought he saw a rivet head pop off.

He checked further and found the rivet still there, but a 3-foot section of the interwall was delaminated and had pulled away from the rivet. He summoned a troubleshooter and told the maintenance coordinator; the flight was canceled.

Had this delamination gone unnoticed, the engine could have stalled because of disturbed air flow or have FODed due to further deterioration of the intake interwall.◀

PH3 James Perkins

AMSAN Paul Smith
VP-26

During a 14-day inspection of a P-3C, AMSAN Smith found a pinhole and discoloration on a push-pull rod of the port-aileron bellcrank. Checking further, he saw a large area of corrosion, which had weakened the rod and locking screw holding the rod ends in place.

AMSAN Smith discovery stopped a chain of events that could have endangered an aircraft and crew. The squadron CO awarded him an Navy and Marine Achievement Medal.◀

AD1(NAC) Steve Hunt
VR-53

During a walk-around inspection of his C-130T, AD1 Hunt saw four linemen trying to start a GTC 85 huffer. They had placed the huffer under the wing and connected it to the aircraft. Finally the unit started and began turning up to speed. Petty Officer Hunt saw a stream of fuel and vapor spraying under the unit at high pressure.

Realizing the linemen didn't hear him while preoccupied with the unit's gauges, AD1 Hunt ran to the unit and did an emergency shutdown. The linemen had been unaware of the danger as hot fuel flowed from under the unit around their feet. If the fuel had ignited, they could have been burned, and the huffer could have burned and damaged the aircraft.◀

The *Greased-Pig* Concept

by Daniel J. Raab

You won't find the term "operational preservation" in a manual; it's a maintenance philosophy. It involves applying preservatives to your aircraft between corrosion-control inspections. Without making such treatment a regular part of your routine, you run the risk of spending too many manhours, too many dollars and too much aircraft down-time for corrective maintenance.

Believe it or not, five minutes spent preventing corrosion can eliminate five hours of corrective maintenance. If you need convincing, talk to a metalsmith who had to drill and remove corroded fasteners. Or ask an electrician who had to cut and splice a corroded connector.

Apply preservatives to all areas of aircraft not protected with a barrier, such as primer, topcoat or sealant. Cover bare fasteners and screws.

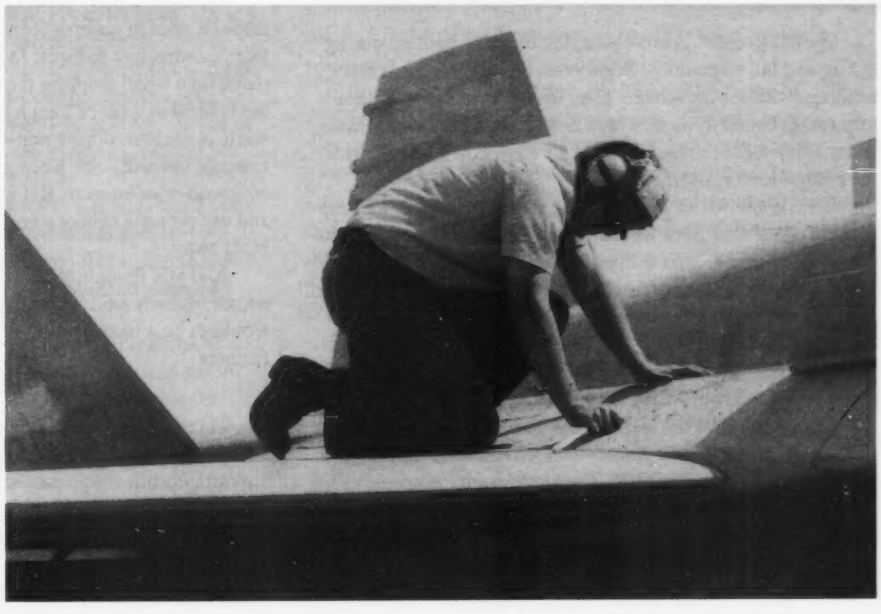
Areas of concern in avionic systems are electrical connectors, mounting racks and attaching hardware. Bonding wires and grounding straps also need preservation because of the galvanic difference in materials. Some people still believe that the high-tech alloys and materials used to build today's aircraft make them corrosion-resistant. Wrong.

Section four *(Aircraft Weapons System Cleaning and Corrosion Control)* of NAVAIR 01-1A-509 and section three *(Avionics Cleaning and Corrosion Prevention/Control)* of NAVAIR 16-1-540 list materials and application methods for areas that need protection. Appendix "A" of both manuals lists approved materials by name, MilSpec, NSN and intended use of each type of material.

The result of corrosion prevention is fewer manhours spent on corrosion control and less down-time for the bird. ◄

Mr. Raab was assigned to Naval Aviation Engineering Unit, Det Cubi Point, when he wrote this article.

Unprotected hardware and bare metal areas take a long time for corrective maintenance to restore. That's why VFA-113 Stingers practice operational preservation.



Snacking on Starlings

by Joe Casto

What's the last thing that goes through a bird's mind when he hits your windshield? His hindquarters — unless you're flying so fast that he comes through the glass; then, the last thing that goes through his mind is your visor.

PH1 J.H. Albrecht

We have bird strikes all year, but the tally goes up during spring and fall migrations. Right now, all kinds of birds are heading south for the winter. They follow four known migratory routes called *flyways.* There is an abundance of food and water along these routes, and birds are like people; they follow the path of least resistance to forage.

If we know where they're going to be, how come we keep bumpin' into 'em? Because there are so many of them. Several billion birds migrate. How does 2,000,000 starlings in a single flock strike you? Starlings aren't very big, but how many could your aircraft eat before you noticed the nerve-shattering, absolute silence of an engine failure just outside your cockpit?

In March '94, at 25-30 feet AGL following the seventh touch-and-go during FCLP, an EA-6B ingested a 10-pound Canada goose down the starboard engine. After a lot of noise and vibration, the engine failed and the engine bay caught fire. The crew completed NATOPS immediate-action procedures for engine failure, continued the takeoff and began an emergency divert to a Marine Corps air station. The fire in the engine bay became unmanageable and the aircraft became uncontrollable. The aircrew ejected as the aircraft began to roll.

Air stations can take bird-control measures

Half of all bird strikes occur in traffic patterns. This is where we can have the greatest effect in reducing bird strikes. Here's how:

Discourage nesting in hangars and areas adjacent the airfield. Eliminate refuse piles and feed-producing vegetation. Remove trees and shrubs that serve as bird shelters. Maintain the height of the grass near airfields at 7-14 inches. The grass must be cut before it goes to seed to discourage seed-eating birds. Long grass discourages flocking birds. It reduces visibility, so the birds can't communicate with each other. They lose their sense of security in numbers, and have a hard time spotting predators. Grass longer than 14 inches attracts other bird species and rodents.

Broad-leafed weeds attract a variety of birds, may produce seeds or berries, and limit grass growth. You can keep broad-leafed weeds down with herbicides. Plant grass in bare areas to discourage birds from resting there. Selectively fertilize grass to get a uniform cover. Promote turf growth but control watering to increase roots and decrease seed-heads. Remove dead vegetation, such as brush piles and grass clippings, to eliminate the cover they afford.

Drain ponds and ditches, and inspect drainage ditches regularly. You want them to be clear of obstacles. Keep the sides of ditches steep with a minimum slope ratio of 5:1 to discourage wading birds and vegetation. Remove vegetation often to maintain flow.

Small ponds or puddles and large bodies of standing water must be eliminated because they attract birds. Leveling high and low spots and maintaining ditches are essential to eliminate standing water. Coordinate your actions with the Army Corps of Engineers and your state environmental agencies that control the alteration of wetlands. Plant vegetation that is appropriate for the region to prevent erosion.

Landfills always attract birds, particularly gulls. Operate disposal sites in accordance with FAA Order 5200.5. Make them unattractive to birds: Incinerate waste when possible, and maintain a small working face to minimize exposure. Operate the landfill as a pit or trench to limit bird access, and dump waste at night or during non-flying periods. Try to cover waste material immediately. Keep gulls and other birds away with overhead-wire barriers. Relocate waste that will turn putrid, and use propane cannons and pyrotechnics (flares) to frighten birds away.

And you thought there was nothing you could do. Of course, nobody said it would be easy. If it was easy, it wouldn't be a hazard; it'd just be an occasional pain in the tail feathers.

Pilots

Three factors influence the damage your aircraft will absorb in a bird strike: the size of the bird, what part of the aircraft gets hit, and impact speed. You can't control the size of the bird or where you get hit, but you can control speed — the key to limiting bird-strike damage.

According to Mr. M.S. Kuhring, Chairman, Associate Committee on Bird Hazards, Canada, a two-pound sea gull

struck by an aircraft at 180 knots generates 8,000 pounds of force. If that aircraft is doing 535 knots, the impact force will be 72,000 pounds. The comparable values for a four-pound duck are 12,800 pounds and 115,200 pounds, respectively. The examples tell us that doubling the size of the bird doesn't quite double the force; but as speed doubles, the kinetic energy that must be dissipated increases by a factor of four.

If the angle is right, that 57.5-ton bird will penetrate whatever it hits. Bird strikes destroy engines, windshields, wheel-well doors, flight controls, and pilots.

A two-seat TACAIR jet flying a low-altitude tactics-training sortie was struck by a 2.5 pound herring gull. The bird penetrated the front-right side of the windscreen, passed through the front cockpit and cockpit blast shield to the rear cockpit, and rammed into the pilot-in-command's right shoulder. The copilot in the front seat was at the controls and had to lean forward and left to stay out of the wind blast. The pilot stated that everything went dark. He tried to contact the copilot over the ICS, with no answer. The pilot could not determine the orientation of his aircraft or the condition of the copilot. Faced with this uncertainty, at low altitude and high airspeed, he command-ejected both aircrew.

Canada geese, mallards, pintails, vultures, starlings and blackbirds comprise the worst threat because of their size, abundance and habit of flying in large flocks. Ducks, geese and swans have been seen above 20,000 feet, and a bird strike has been recorded at 33,000 feet. If you're flying cross country at 35,000 feet, you won't be impressed. Before you get too comfortable and put your brain in idle, ask yourself, "How many times do I have to pass through that feather curtain to get to altitude or back on the deck?"

In addition to flyway traffic, there are mass movements of birds between feeding and roosting areas. Most naval air stations are in those flyways and roosting areas. How close is your runway to flocks of feeding or roosting birds?

If you are unfortunate enough to hit a bird, your bird-strike report should be as specific as possible about location, altitude and what you were doing when the strike occurred. This is especially important at the point of landing where many clues are available to pinpoint your exact location. For example: A report of, "Hit bird following touch-and-go at NAS," is not as useful as, "Hit bird passing 2,000-feet-remaining marker, 40 feet AGL, following touch-and-go runway 35L…"

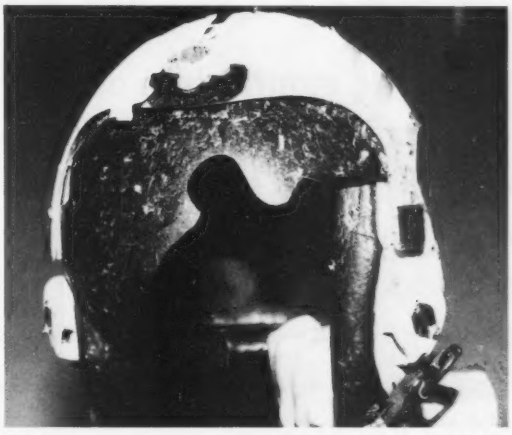
A compilation of low-altitude bird strikes near the 2,000-feet-remaining marker would indicate that this area is especially attractive to birds. Public works could investigate and look for standing water, seedheads, abundant and exposed earthworms or other things that attract birds.

Study bird habits and be aware of conflicting altitudes and areas. Address specific questions to the state fish and game department, U.S. Fish & Wildlife Service, Naval Facilities Engineering Command, or the Naval Safety Center.

Minimize flight below 5,000 feet and avoid flying under bird formations; birds tend to dive when approached by aircraft. Reduce airspeed at lower altitudes to give unseen birds the opportunity to dive out of your path.

Eliminate touch-and-go landings when there are lots of birds in the vicinity of airfields. Report concentrations of birds to the controller.

Most small birds migrate at night; they usually fly in humongous flocks, and they always fly faster than normal while migrating. It follows that if they're flying at night, they can't see you easily. When those flocks are on the move, you've got a helluva big obstacle out there, so don't disregard strange radar returns. Use your taxi and strobe lights at night to help birds see and avoid you.



Your visor and mask are your last line of defense.

You must accept that if you're flying at a high enough speed and the angle of impact on your canopy is right, you're going to eat bird-under-glass no matter how strong you think that canopy is. Consider suddenly being unable to communicate with anyone; the deafening sound of air rushing into your confined space; shattered plexiglass, bits of bird guts, maps and approach plates loose in the cockpit whizzing around your head. The numbness when your body absorbs the crushing kinetic energy not expended on your windscreen from a 57.5-ton bird strike. How much will you feel? If your visor and mask aren't in place, you're buzzard-bait.

From 1 January 1992 through 23 June 1995, the Navy had 27 Class A, B and C mishap bird strikes. The total cost — $98 million. From January '94 through the first quarter of 1995, we had 637 bird strikes, including nine Class Cs, one Class B and two Class As. We don't know how much the other 625 bird strikes cost us. With less than class-C damage, each one is worth less than $20,000. If we assume an average of $5,000 per shot, that's another $3,125,000 — that ain't chicken feed. ◄

Bird-strike statistics and narratives in this article came from Mr. Jeff Davis of the Northern Division of Naval Facilities Engineering Command, and Mr. Charles Byrd, Naval Safety Center. Information and guidance for establishing a "Bird Aircraft Strike Hazard" (BASH) reduction program can be found in the Real Estate Operations and Natural Resources Management manual (NAVFAC P-73), and Peter Jarman's "A Manual of Airfield Bird Control," published by Birdcheck, 26 Park Lane, Blunham MK44 3NJ, United Kingdom.

FOD: Be part of the solution... not the problem

Three months into our cruise, we had FODed eight engines at a cost of $11,470,529. People in our air wing and ship's company were dumbfounded. With four flight-deck and hangar-bay FOD walkdowns a day and an active tool-control program, we couldn't understand why we were having so many problems.

by Lt. Richard Lorentzen

We reevaluated our efforts and involved all hands in FOD prevention. Everyone in the airwing and ship's company had to work together to beat the problem. We looked at all maintenance and housekeeping practices shipwide.

We learned that people whose jobs don't take them outside the skin of the ship believe only topside FOD is important. In reality, FOD in the hangar bay eventually ends up on the roof. Everyone on the ship transits the hangar bay.

The solution has several basic elements: Schedule and conduct daily FOD walkdowns on the flight deck and hangar deck. All hands participate with their eyes on the deck and not talking. Check padeyes, support equipment, sponsons, in catwalks and under aircraft — look everywhere.

Make sure air wing and ship's personnel working on the hangar bay and flight deck practice tool control: All tools etched, stored in their containers and accounted for in checkout logs.

QARs, CDIs and supervisors must check work in progress. Look for sloppy work habits and monitor tool and fastener control.

Maintenance personnel, CDIs and QARs must inspect removed panels, fasteners and fastener retainers. Check all aircraft going from the hangar deck to the flight deck for any missing or loose parts. Inspect tire treads for FOD.

Have maintenance personnel walkdown for FOD after every task is completed.

QARs and CDIs must check the flight deck and hangar deck each morning for FOD under squadron aircraft. This precaution helps you spot dropped safety wire or other small hardware from blue-light maintenance the night before.

Hold briefs and discuss what FOD is, what causes it and how all hands can help fight it. Publicize FOD with notes in the POD, safetygrams, bulletin boards and ship's TV.

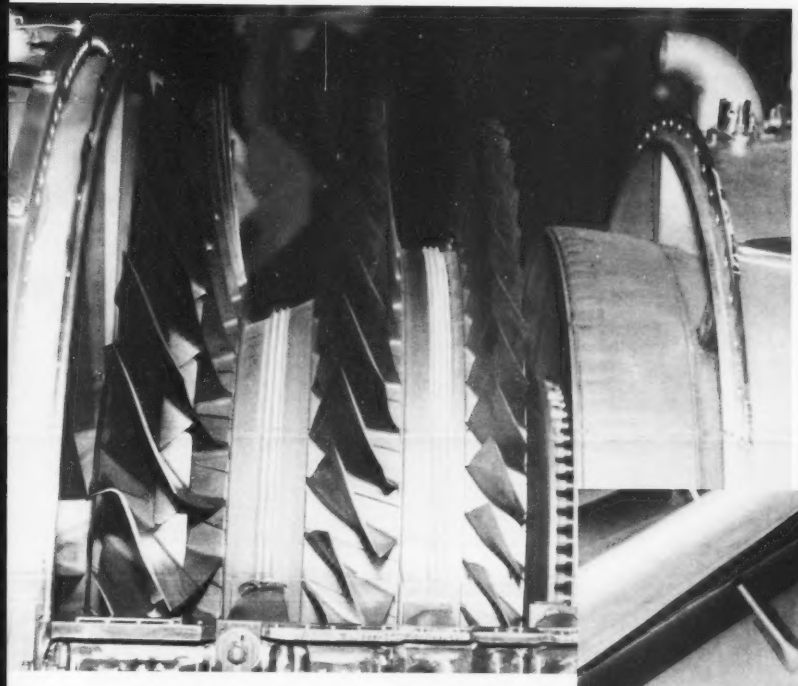
Make people accountable for personal FOD checks (cranials, float coats, empty pockets, no loose gear) before entering the hangar deck and flight deck.

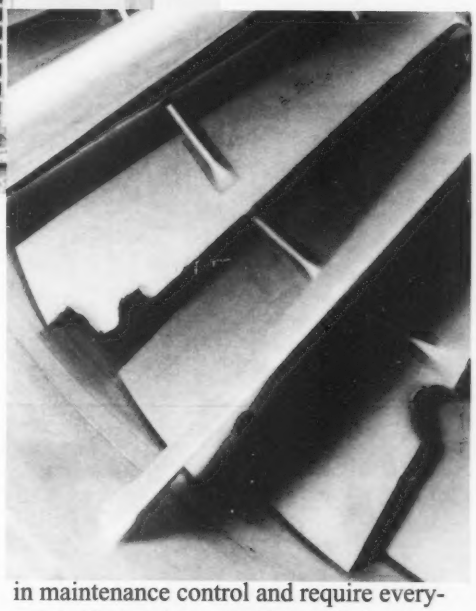
Conduct combat-FOD walkdowns of the landing area with flight-deck personnel after every recovery cycle.

Inspect all aircraft intakes before and after flight in the presence of aircrews.

Ensure a consumable-item accountability program is in effect. Make people use MAF bags to transport and account for such items. Pockets and tool containers are not acceptable.

Supervisors and khaki must be visible constantly, not just during FOD walkdowns. See what your people are doing and how they do it. Get involved; let them know you're monitoring the action.





A strong anti-FOD program eliminates damage like this.

FOD awareness is like good health; if it is nurtured instead of neglected, it consistently improves. When you don't check it continually, it deteriorates and results in a FOD incident—a sad way to regain attention within a command.

Keep the program fresh with new ideas. Lend incentives to FOD walkdowns, such as Golden FOD. The finder is awarded a 48-hour pass and head-of-the-line privileges. The "I-got-my-piece" program has worked wonders for us. Just put a FOD bag in maintenance control and require everyone to find a piece of FOD and bring it in during the day. Soon, healthy competition is begun and people actually search for FOD throughout the ship.

Use any programs you want. Just do it consistently and keep the motivation high for a FOD-free environment.◀

Lt. Lorentzen was aircraft division officer for VFA-137 at the time he wrote this article.

FOD awareness is like good health; you take it for granted until it goes bad.

"Prepare to recover aircraft! Stand clear of the starboard foul line and port catwalk."

Crossing the Line

by AME2 S. Griffin

The Air Boss shouts this command several times each day. I was reminded of the vital importance of this familiar order during a case 3 recovery with less than one-half mile visibility.

My flight-deck chief and I were standing near the foul line forward by the crotch area. We were watching aircraft materialize out of the mist just short of the rounddown. An FA-18 suddenly broke out considerably left of the centerline. As if frozen, we watched the pilot correct, then over-correct to starboard. He came within inches of wiping out all aircraft abreast the island and the unsuspecting people around the hummer hole.

Finally realizing our peril, we sprinted to the starboard catwalk. Feeling exceptionally cozy, we didn't move until our aircraft had recovered.

They say, "Out of every adversity comes an equal or greater benefit." You can bet I will benefit from my experience! The next time the Boss sings out, "Stand clear of the foul line," I *will* heed his call. ◄

PO2 Griffin is assigned to VAW-114.

Overcorrecting to starboard, an FA-18 came very close to wiping out everything abreast the island. Unless you have pressing business on the flight deck, stay below — you'll live longer.

A CASE OF MISTAKEN IDENTITY

Anonymous

Sailors reenact an episode from this article. A metalsmith walks away from the wrong aircraft carrying a Q-feel actuator. Stopping him are an AT, an AMH and an AE from a sister squadron. "Like, where are you going with that actuator, Dude?"

They told us at the morning meeting to change a Q-feel actuator on a newly acquired aircraft. Meanwhile, maintenance control directed an AE3 to remove an anti-collision light from the bird; it was the only aircraft parked on the flight line. He did the job, then began trouble-shooting a hangar queen to keep it out of SPINTAC.

After a break, maintenance control tasked the AE3 to remove the actuator from the new bird. Two other aircraft had been parked on both sides of the new bird since he had removed the anti-collison light. One belonged to another squadron.

After finishing the job, he was walking away from the aircraft when he was stopped by three Sailors from the other squadron who asked, "What were you doing inside our aircraft?" At first he thought they were joking, but he quickly realized he had removed the actuator (which he had in his hand) from the wrong aircraft. The plane had different squadron markings, but its side number was almost identical to that of the new bird.

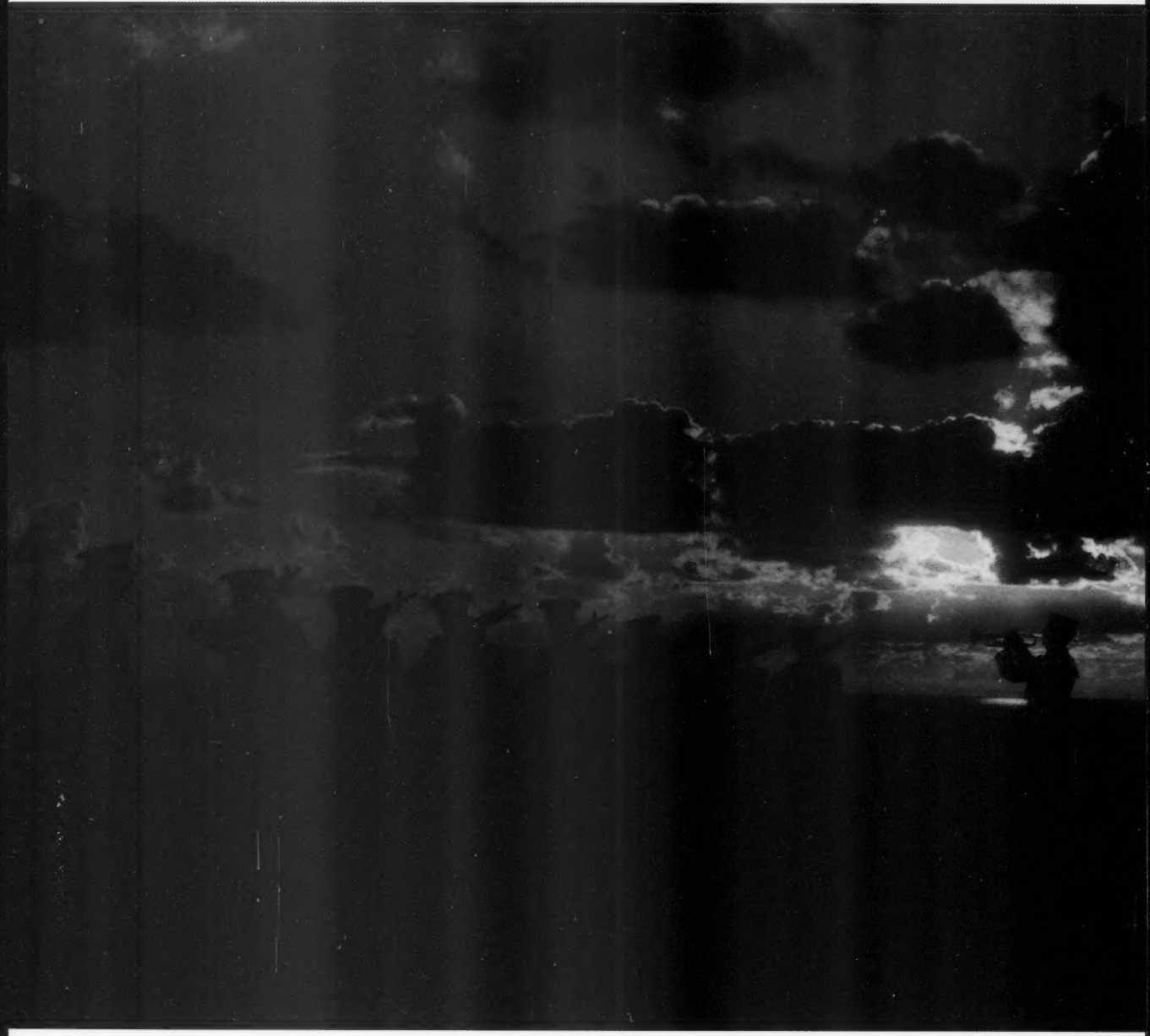
The aircraft he'd removed the actuator from was being readied for a mission with the wing commander. The launch had to be delayed until the part could be replaced and the aircraft op-checked. A riled wing commander went to maintenance control to find out whose side we were really on. To make matters worse, he discovered that we hadn't issued a MAF before removing the part.

Such mistakes waste time and money and are dangerous. Failing to pay attention to detail (like what plane am I working on?) fosters improper maintenance, which leads to mishaps.

Two good lessons learned here: Make sure you're working on the right aircraft, and never order a job done without first issuing a MAF to cover it. ◄

HOW AVIATION GROUND MISHAPS KILL PEOPLE

1984 - 1994



PH3 Douglas G. Porter

by Gene M. Feierstein

From 1 October 1984 through 31 December 1994, 20 people died in aviation ground mishaps. Eleven of the 20 mishaps fall into two broad categories: wheeled vehicles (tow tractors/power carts) and aircraft-engine operation.

There were seven in the "wheeled vehicle" category.

Three Sailors were run over by towed aircraft: an A-6E, an SH-60B and an SH-60F. Another died riding brakes in an A-7E. The aircraft broke loose from the tug and went over the side when the ship rolled.

Two power-cart drivers were crushed backing their vehicles into aircraft: an F-14A and an EA-6B. One tractor driver was crushed between his TA-75 and an S-3A. He lost control dragging a ballasting device too fast and close to aircraft. The load shifted, and he was wedged between the tractor and an engine nacelle.

Operating engines accounted for four deaths.

Two Sailors were blown overboard by jet exhaust and lost at sea: one by a KA-6D and one by an F-14A. A safety observer (ordnance officer) raised his head into the prop arc of an idling OV-10. He was filling in as a QA observer, inspecting a centerline flare pod during hot arming. His background was in jets. A grape died when he walked into the turning tail rotor of an AH-1W; he was dragging a fuel hose with his back to the aircraft. All except the last mishap occurred at night.

Two mishaps killed more than one person.

The pilot and RIO of an F-14A were ejected during post-landing respot; the equipment they were transporting hit the ejection-seat initiator.

Two people were shot to death by an A-7E during an operational check of an M61A1 gun system. The gun had not been downloaded before the check.

The remaining five fatalities were unrelated. In chronological order:

- A CAD that should have been removed from the external stores of an F-14A after flight ops fired during a jettison check and killed an ordnanceman.
- An A-6 BN ejected when a fuel spill in the refueling pits ignited and engulfed the aircraft. The pilot climbed out of the cockpit and lived.
- A flight-tech trainee was troubleshooting a very-low-frequency power amplifier on an E-6A's radio system. He died from electric shock while in a designated high-voltage area with power applied.
- The nose-landing gear of an S-3A collapsed and crushed a troubleshooter. Improper troubleshooting procedures and poor communication contributed to this mishap.
- A Marine was lost overboard from the ramp of a CH-53E. He fell 10 feet onto a gun-tub rail, then another 40 feet to the water. Unable to inflate his LPU-30/P float coat, he sank within three and a half minutes. ◀

Mr. Feierstein is a statistician at the Naval Safety Center.

Editor's note: *These people were killed by shortcuts, poor training, not following SOP, jury rigs and lack of situational awareness. We also had 34 people permanently disabled and 323 others seriously injured for the same reasons.*

Get Out of My Way!

by AE1(AW) Gil Becerra

I was in hangar-bay 2 doing a CDI inspection on a corrosion-prevention gripe, when I heard, "Launch the alert E-2C!" over the 5MC. I made my way to the shop, grabbed a tool pouch, and was at the man-up on the flight deck almost before the echoes of the announcement died.

The alert had to be airborne within 30 minutes. Unidentified aircraft were inbound and the E-2C had to direct the intercept. At least three troubleshooters from each work center were attending the launch, along with two flight deck coordinators. Everyone wanted to help because this launch was important.

"The more personnel available, the quicker the launch," right? Not so. There were far too many people on the flight deck. There was also an attitude of *"No time to worry about that now; we have to get that bird airborne."*

Everyone hustled; AEs and ATs hooked up electrical power, and PCs removed groundlocks while mechs and tinbenders inspected the integrity of the aircraft.

Everything was good-to-go when the aircrew arrived. We formed a safety chain and within minutes the port prop was up to ground-idle. We'd show this CAG how to launch an alert.

A few seconds later, a PC signaled for an electrician. Mindful of the prop arcs, I carefully entered the aircraft. Approaching the cockpit, I heard the pilot shout over the noise, "The external power turned itself off!" I tried to reset the power switch. No joy — had to be the power cable.

I signaled to a PC for an alternate power cable. A flight-deck coordinator helped by pulling the cable as I fed it to him from the hatch. We were working as fast as we could, and the adrenalin was pumping. Gotta look good for the boss. The coordinator pulled the power cord directly to the power receptacle without noticing the stationary propeller.

Keeping people out of those 13-foot blenders is serious business.

Walking through a prop arc or routing an electrical cord under it are safety hazards; each violates SOP. I had the power cord pulled and rerouted around the prop.

After both engines reached ground idle, the PC signalled for the AE to disconnect power. The other extremely motivated coordinator took it upon himself to disconnect power rather than let one of the AEs do it. In his excitement, he neglected to first shut down the power at the source (another violation of SOP).

Fortunately, the power station worked as advertised and shut itself off as our coordinator removed the cord. No damage, nobody hurt and the aircraft taxied. Being the sierra-hotel ground pounders we are, the E-2C made the launch with time to spare.

We learned some important lessons that day: First, there should be no difference between an alert launch and a routine launch. People train everyday to learn their jobs and are ready to do them well at a moment's notice. Things just need to be done fast when you have to launch an alert, not differently. For example: It makes sense for the AE who pulls power on a normal launch to do it for an alert. Changing that confuses things, and opens the door for mistakes; mistakes have consequences.

Next, despite the urgency, you do not compromise safety or SOP. The few seconds it would have taken to rig the power cord properly would not have cost us the launch, but someone could have been injured or the plane damaged just because "it was an alert!"

The event rushed us, and could easily have overcome us. What will happen to you the next time the 5MC blurts out, "Launch the alert… ?" ◄

Petty Officer Becerra is assigned to VAW-117.

Fandango

by ASC(AW) Bryan Griebel and AS3 Tom Porter

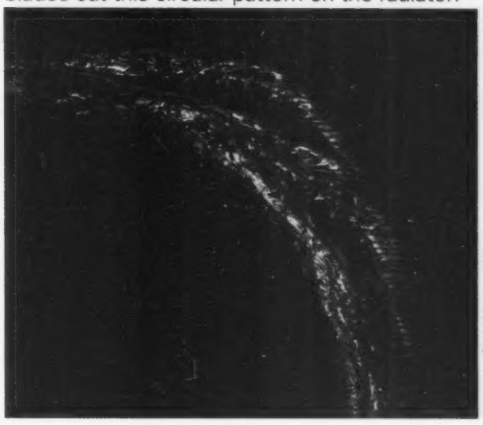
Two support equipment technicians replaced an igniter assembly on a Trumptruck, which is used to deice aircraft. Before starting the engine, which hadn't run for some time, an AS had to prime the throttle manually.

In the rear compartment, he leaned over the engine to move the throttle with his right hand. He rested his left hand, holding needle-nose pliers, on top of the radiator as he primed and pumped the throttle.

Another AS started the engine from outside the compartment, startling the technician in the engine compartment, who dropped the pliers into the spinning blades of the fan. With pieces of metal flying, he scrambled out of the compartment, yelling "Shut it down!"

After the engine stopped, they found the pliers on the deck of the compartment. One fan blade was bent and punctured, and a fancy circular pattern was cut into the radiator (see photo).

Needle-nose pliers dropped into spinning fan blades cut this circular pattern on the radiator.



Photos by PHAN Blaine Miller.

This could have injured the technician who was leaning over the Trumptruck's engine. Lucky for him the pliers didn't fly out with bits of radiator fins. He should have gained access to the throttle actuator from the exterior side in the rear, after removing an access panel. The need to expedite repairs should not "trump" safe maintenance practices. ◄

ASC(AW) Griebel and AS3 Porter are with the AIMD at NAS Brunswick.

Attention AOs and AMEs

by Steve Martin

Naval Surface Warfare Center's CAD/PAD Department tests explosive components found in such equipment as ejection seats, canopy-removal systems in helicopters, and the units that release ordnance stores. Primarily, their findings help determine service life.

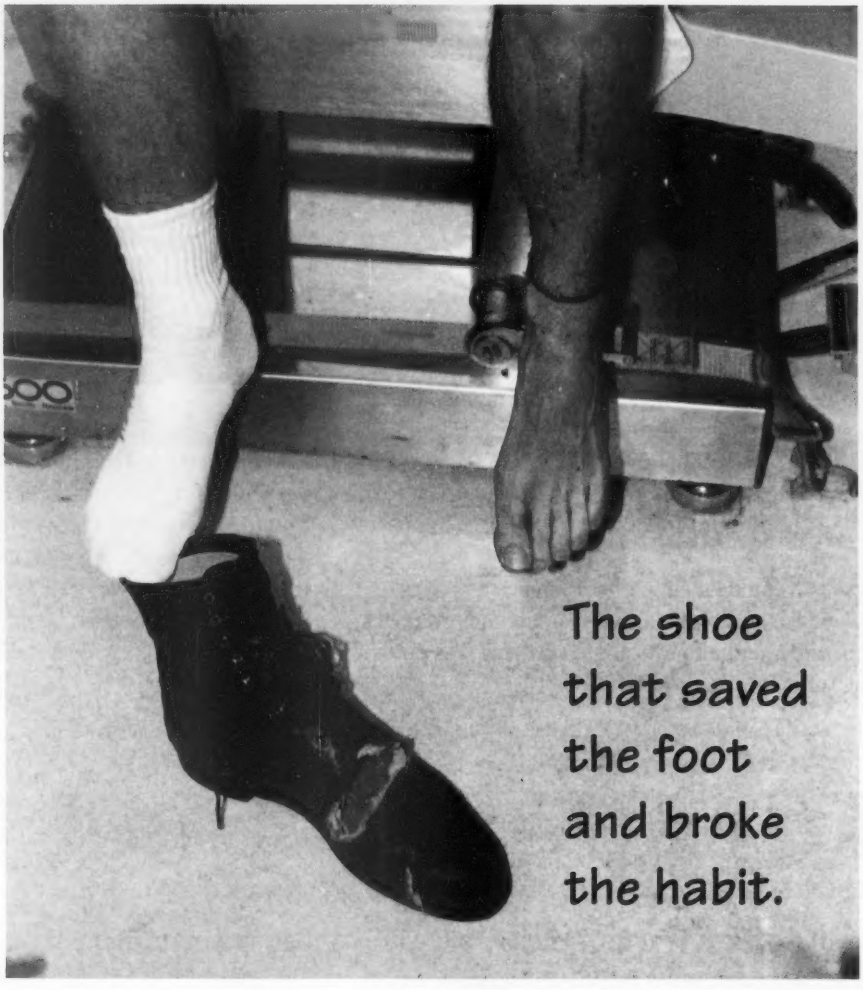
NSWC Indian Head, Maryland calls this program "Quality Evaluation testing." We need your help with the packaging of items before you turn them into the supply system. The packaging is important because NSWC can't learn much from material that gets damaged during shipping.

The best way to protect the unit you remove is to ship it in the container the new unit came in. Also, by using the original packaging, you won't have to worry about storing or getting rid of it.◄

Mr. Martin is an aerospace engineer at NWCS Indian Head.

How to Break a Bad Habit

by Lt. Larry Peck



During flight quarters, a tow-tractor driver was backing to hook up with a tow bar. He had a bad habit of dragging his foot on the deck as he drove the tractor.

He decided to check the clearance between his foot and the front tire, so he extended his foot. Surprise! No clearance! In a split second, the tire rotated backward over his stretched-out foot.

He panicked and hit the gas and brake pedals at the same time. He finally stopped the tractor, but not before it ripped his boot in half (note photo). Luckily, the shoe protected his foot. He did have a slight strain in his left knee.

This Sailor could have lost his foot to his comfortable habit or even been pulled from the tractor and run over. A couple of tons of steel rolling across your leg, chest or face isn't going to make you prettier and could put you in a closed casket. ◄

Lt. Peck is safety officer aboard USS *Essex*.

PH3 M.R. Kopp

by Bud Baer

A crew was preflighting a P-3 at a divert field for the return flight to home base. A daily-inspection team had also been dispatched to the scene. They found a leaky fitting on the landing-gear selector valve.

The metalsmith sent to perform the daily closed the star valve to stop the leak, since equipment needed to repair the leak was not available. He didn't tell anyone he had closed the valve, and no one noticed the broken safety wire on the valve handle.

The P-3 took off with the valve closed, and the aircrew couldn't retract the gear. After selecting gear-up on departure, the light in the gear handle remained lit with all gear indicators showing down and locked.

Excess drag caused by unretractable landing gear at high gross weight makes it harder for an aircraft to climb.

They flew dirty for 15 minutes before returning to home base. Mechanics wired the valve open during postflight maintenance after a satisfactory leak check.

"Like other P-3 squadrons that have had aircraft take off with a closed star valve, we should have caught this one on the ground," the CO said. "Time and again, we see that communication is the glue that holds our processes together and makes them work.

"We've built checks and balances into our maintenance and flight procedures to protect against breakdowns in communication. The inspection process is one of those checks. Too often, however, our inspections don't work for us because they're narrowly focused; i.e., we go in and look for a specific thing but aren't suspicious enough to examine the bigger picture, just in case."◄

If the star valve is closed, you'll be flying with fixed landing gear.

Break the ACCIDENT Chain

by ADCS(AW) C.F. Laird

You probably know that the expression "accident chain" refers to a series of events leading to an accident. The actions of each person involved in the accident are links. Sometimes the chain involves people who were nowhere near the scene, yet whose actions played an important part.

The photos shows an aircraft wash in progress. I can identify six links. How many do you see? Write to me if you see more and we'll publish your letter.

1. S-3B aircraft is missing one chock.
2. Protective covers not installed on aircraft.
3. Wings not spread; flaps not lowered; speed brakes not open.
4. Personnel protective equipment (i.e., rubber gloves, boots and eye protection) not worn.
5. SE equipment (i.e., B4 or B5 stand) not used.
6. SE tractor and flatbed trailer not chocked.

Our training, SOP, maintenance instructions and qualications are supposed to break the accident chain. Each requirement gives us another shot at it. Therefore, everytime we ignore something, forget or just not do it, we add another link to the chain. ◄

Senior Chief Laird is a maintenance analyst at the Naval Safety Center.

How many safety violations do you see?

CROSSFEED

Cdr. M.B. Pearsall
Head, Aviation Maintenance and Material Division

AZCS(AW) Dan Steber
Editorial Coordinator

POWER PLANTS

FODed Engines on the Rise

by ADCS(AW) Wayne Hayes

The Navy and Marine Corps FODed 320 engines during 1994. That's a 25-percent increase over 1993's total of 260. This is the second year we've increased the number of engines FODed. The table below tells you how we've done in the past five years.

Year	FODs	Cost	Birds/Ice
1994	320	$32,442,689	35
1993	260	$17,064,379	42
1992	221	$11,343,005	32
1991	276	$15,380,465	42
1990	301	$12,994,912	36

In 1994, we identified the cause in 71 cases: birds, ice, aircraft parts, aircrew gear and fasteners. The big winners were birds and ice. There were 249 FODs reported for causes we could not identify (a 44-percent increase).

We've blown $89,225,450 on FODed engines in five years. We have to take a harder look at our anti-FOD programs before we run out of engines.

Senior Chief Hayes is a power-plants analyst at the Naval Safety Center.

Business as Usual

by LCdr. J. R. Haley

I was enjoying a leisurely preflight in the sun when I found the fin on my drop tank loose. It moved about 1.5 inches from side to side at the tip. Two hex nuts inside the tail cone held the fin in place.

I called a troubleshooter to look at the problem. He said it was OK and we'd been flying it like that for several flights because they had tried to tighten it and were unable to get it secure.

I envisioned a drop-tank fin flying by a windscreen. I asked the troubleshooter to try to tighten the fin. He cheerfully agreed and began to work on it with his multi-purpose tool — a screwdriver. After he struggled to tighten the nut, I recommended a hex socket. He didn't have one, but he got one from the shop.

I mounted my flying machine, confident that I did the right thing and that the maintainer would fix the fin. Shortly after engine start, he came up the boarding ladder to say the fin was tight. He had a smile on his face and seemed pleased that we did things correctly. On my postflight, just as expected, the fin was tight.

I know I'm not a hero who prevented a Class A mishap, but I did break the chain of doing business as usual. Sometimes, we get used to accepting things as they are when we shouldn't.

LCdr. Haley was a pilot with the Swordsmen of VA-145 when he wrote this article.

LINE

I Couldn't Believe My Eyes

by Lt. D.K. Williams

I witnessed a horrible accident on the flight deck. A blueshirt was walking chocks beside the port main mount of an F-14. As the tractor pulled the Tomcat toward Fly-3, something distracted the blueshirt. He was struck in the back by the outboard missile station. Before anyone could react, he had been run over by the 30-ton Tomcat's port tire.

Both of the blueshirt's legs had been crushed and severed from his body just above the knees. His legs were gone forever; the flight deck emergency medics were fighting to save his life. He suffered classic degloving injuries; a large portion of the skin had been pulled away from the remaining stumps. Miraculously, he survived.

Once the stretcher had been removed from the flight deck, it was back to launching aircraft. Except that now there was an eerie calm superimposed over the hectic and loud atmosphere. No one could completely ignore the crew that was hosing down the blood-soaked deck and picking up pieces of skin and bone that had been mashed into the non-skid.

We were going through the motions of another launch, but no one on that deck would ever forget the gruesome reminder of how lethal the flight deck can be.

The most terrifying thing about this incident is that the jolt back to safety consciousness lasted only two days. Then it was back to carelessness and horseplay.

If you're one of the elite who draw flight-deck pay, take this message to heart. Never let your guard down. Just believe that flesh and blood are no match for titanium and steel.

Lt. Williams was an F-14 pilot with the Fighting Freelancers of VF-21 when he wrote his article.

Analyst's comment: *Lt. Williams' advice doesn't apply to only those collecting flight deck-pay. On a sunny morning ashore, a wing walker was killed when he was run over by an aircraft under tow. We average five major injuries a year moving aircraft and countless others from falls, burns or cuts and degloving injuries. Try to anticipate hazards and make sure you learn SOP before you cinch the strap of your cranial and lower your goggles.*

Senior Chief Dan Steber is a maintenance analyst with the Naval Safety Center.

ALSS

Are You Wearing the Correct Life Preserver?

by Lt. Barrie Hartley

If you embark with a CAG, squadron or ship's company flight-deck crew, will you have a Mk-1 float coat? It's not just issued to identify your specialty. Your float coat should have these items:

strobe light, sea dye-marker, whistle, and a CO_2 inflation system. They will protect you and help rescuers to find you should you happen to take an unplanned swim. However, the equipment is only useful if you know how to use it and if it works.

Can you remember when you last had a survival brief and when your life preserver was last checked? Do you know which of the following three variants you have and if it's the right one?

a. Mk-1 with manual inflator
b. Mk-1 with automatic inflator
c. LPU-30 with manual inflator

The automatic inflator takes one CO_2 cylinder; the manual inflator takes two.

The Mk-1 life preserver used by personnel working on the flight deck is controlled by NAVSEA. The auto-inflator system is recommended for most fight-deck assignments. It automatically inflates when submerged in water — a great help if you are injured or unconscious after falling 60-plus feet from the flight deck. The Mk-1s are maintained IAW NAVSEA's PMS MIP instructions 5832/006-42 (manual inflators) and 5832/002-24 (auto-inflators).

Note: Mk-1s fitted with auto-inflators should have a warning notice on the inflation-assembly flap indicating that they should not be used in aircraft. The notice should be attached by the person who puts the assembly together.

The LPU-30 life preserver is fitted with a white cover; it's used by passengers in Navy helos. This float coat must be fitted with a manual inflator, designated for aircraft use only and labeled as such. The LPU-30 should be maintained by PRs in accordance with NAVAIR 13-1-6.1.

Don't be tempted to wear your Mk-1 as a passenger in an aircraft if you have the water-activated automatic inflator installed. Wearing an automatically inflating float coat in a ditched helo is dangerous. The float coat's auto-inflation system activates on contact with water and gives the wearer positive buoyancy. This could trap you in a submerged helo.

Before you go on the flight deck, ask yourself about your gear. Do you have a manual or auto-inflator-fitted float coat? Is your life preserver serviceable and current for maintenance? Are all your survival aids intact and do you know how to use them?

When you take your next flight as a passenger, make sure you are wearing an LPU-30 and not a Mk-1 with an automatic inflator, and that you get a pre-flight safety brief.

Don't assume--check!

Lt. Hartley is an exchange officer from the Royal Navy and he runs the ALSS branch at the Naval Safety Center.

The wide range of the colors used on the Mk1 float coat identify the wearer's specialty, but that is just a side benefit.

SUPPORT EQUIPMENT

Problems in Chain Land

by ASCM(AW) Mike Bowers

While conducting safety surveys, I've found problems with OPNAV Form 4790/51 cards. Yes, documentation. The thousands of chain records I've looked at show that most chains are inspected on a 30-day cycle, reflect all SECs, and are generally in good working order. However, the paper work that supports the action needs to be improved.

The following suggestions can make most tie-down chain problems disappear and maintenance procedures routine. First, use the Type Equipment Code (TEC) assigned to the chains on all MAFs or in NALCOMIS (which ever applies to your activity). The TEC is GPND for the 9-foot chain and GPNE for the 14-foot chain.

Next, get a container (empty ammo can or small barrel) that can hold 10 or more chains. Label the container with a serial number that you can deal with (BOX001; BAR001; CON001 or whatever). The serial number of the container will be the one you report on the MAF, NALCOMIS, and on the /51 card. According to our AZs, you can process up to 99 items with the same part number and TEC on one MAF. In this case, we will process 10, 15, or even 50 tie-down chains at one time.

After you know how many chains per container and the serial numbers assigned to that container, write the serial numbers of the chains in the margin of the /51 card in pencil. Example: container (serial number) BOX001, holds chains with serial numbers SSF100 through SSF109. That's 10 chains assigned to BOX001. Result: Maintenance on 10 tie-down chains is recorded on one MAF and one /51 card and shows one unit (10 chains) processed.

If you do it this way, you don't have to report a maintenance action for the other nine chains. Otherwise, you would submit a MAF and a /51 card for every chain you have. That's an average of 180 MAFs and 180 /51 cards just to manage your chains. Preserving the chains also becomes more manageable using the same method you just read about to record and document chain maintenance.

This method worked very well for me when I had 650 or so tie-down chains to keep up with aboard ship.

Master Chief Bowers was a maintenance analyst at the Naval Safety Center before he retired.

AIRFRAMES

U.S. Government Ball Point Pen, One Each

by Capt. Kevin G. Emery, USMC

An aircrew was doing their pre-takeoff check list when the pilot felt binding in the control stick during wipeout. This happened twice before the problem stopped. The aircrew downed the aircraft to investigate the binding.

While troubleshooting the flight-control system, using their conditional MRCs, technicians found a bent U.S. government pen under the pilot's-side floor boards beneath the control stick. This caused the binding.

Aircrew and maintenance personnel should be aware that pens and other writing instruments are potential FOD when taken aboard aircraft. Every squadron should have a policy of control for these items. Does your FOD program take pens into account?

One note for the aircrew: When you feel binding on the deck, stop moving the control stick and leave it in the binding position. This makes it easier for the mechs to find the cause.

Capt. Emery was the power plants branch officer at the Naval Safety Center before transferring to HMT-303 Camp Pendleton.

HAZMAT

Making Maintenance Environmentally Sound

It's Only Soap and Water

by AEAN Jennifer Holland

I work night check in the line division, but one sunny day I came in at noon to help wash an airplane. Everyone pitched in so we could get it done before quarters that afternoon.

This was my first aircraft wash, so I wasn't familiar with the procedures and knew nothing about the personal protective equipment (PPE) for washing aircraft. Despite this, I wasn't concerned because it was such a simple task.

I didn't wear my gloves or goggles while washing the aircraft. Shortly after we started, my hands came in contact with the cleaning compound and began to itch and burn. I went to sickbay and was diagnosed with first degree burns caused by chemical exposure. I didn't realize the importance of personal protective equipment until it was too late.

Fortunately, I only lost one day of work, but it could have been worse according to the doctor. Don't let this happen to you or your shipmates. If you are unfamiliar with procedures or PPE requirements, ask your supervisor for help. Get to know your PPE, maintain it and wear it.

AEAN Holland was in the Line Division of HSL-33 when she wrote this article.

Analyst's comment: *Every Sailor is required to be briefed on hazardous materials used in the work place. Most commands have a read-and-initial process to ensure that requirement is met. However, just because someone initials a sheet doesn't mean they are familiar with it. Supervisors must make sure their people read and understand the MSDS sheets, and that they know how to use PPE. That's just part of being a supervisor.--AZCS Dan Steber.*

There's More to Hazardous Waste Than Smelly Barrels

by AD2 Donald McGraw

Two AD3s replaced a clogged accessory-gearbox filter on a TF-30 engine from an F-14A. They placed oil-soaked rags and waste oil from the job in hazardous-waste barrels, but they threw the clogged oil filter in the trash.

The next day, someone found the oil filter in the dumpster. The shop supervisor verified that his shop had changed the filter and disposed of it in the trash. The supervisor had made a mistake. He'd forgotten that *all used filters must now be treated as hazardous waste.* He couldn't believe he had allowed this to happen, especially after recent training on disposing of hazardous waste.

The supervisor had been the CDI on this maintenance task, but didn't ensure the job was completely finished. He was so caught up in the job that he didn't supervise. A junior mechanic could have stopped this event, but was too intimated to speak up when he saw the supervisor dispose of the filter.

Proper handling of hazardous waste is mandatory. We were lucky we caught the error ourselves; a federal or state inspector would have fined us. Supervisors are human and occasionally make mistakes. Don't hesitate to question one if something doesn't seem right to you. You're just watching out for your shipmates — that includes your supervisor.

AD2 McGraw was in VF-111 when he wrote this article.

SUPERVISION

PFOA - People Falling Off Aircraft

by Lt. Patrick Nash

Sir Isaac Newton said, "What goes up, must come down." Two sailors in my division ended up in casts after proving the accuracy of that observation. It takes only a split second for something to go wrong when the laws of nature are involved.

I was corrosion-control- and airframes officer and on my first six-month Med cruise. It was hectic learning a new job and getting used to life at sea. My goal was to make sure we worked quickly and correctly. Unfortunately, it's easy to overlook cer-

tain routine hazards. A couple weeks after taking over the branch, one of my men fell off an aircraft. He collided with the hangar deck and ended up with his wrist in a cast. I didn't see a pattern until another Sailor from my shop fell off an aircraft and fractured his wrist too. His cast ran from his wrist to his elbow.

Investigating, I found the shop hadn't held general (aircraft) safety training in several months — and they weren't the only ones. The entire squadron was shortcutting safety. We particularly needed to train about how to deal with Newton's law of gravity.

We implemented a monthly safety-training program that stresses attention to detail. So far, we haven't had any more injuries. In carrier ops, lack of attention can be deadly. Reinforce your training; don't let Newton's law turn your troops into PFOA.

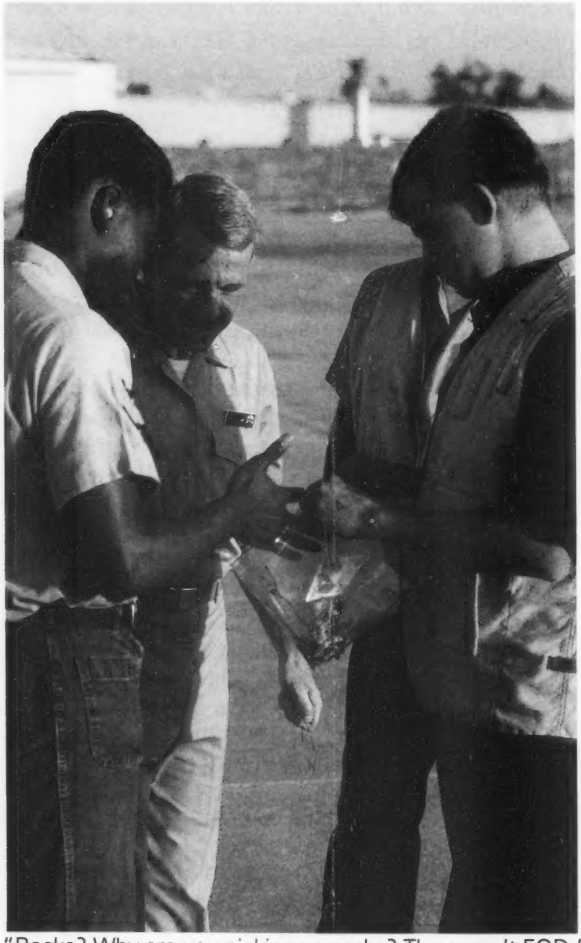
Lt. Nash was on aboard USS John F. Kennedy with VS-22 when he wrote this article.

Analyst's comment: *Accidents don't just happen; most can be traced to a flaw in risk management. There have been 31 casualties from PFOA reported since January 1990. The damage ranged from bruised elbows to death and cost the Navy $282,000. Identify hazards early on, train around them and wear your PPE.--AZCS(AW) Dan Steber*

Sticks and Stones Can Break Your Bones

by AT1 T. W. Bailey

PHAN Michael Fleischhauer.



"Rocks? Why are you picking up rocks? They aren't FOD."

During a FOD walkdown, I paused to pick up some small rocks and pebbles. A young airman approached me with a FOD bag and I dutifully deposited my cache of stones. The FOD collector wondered why I had bothered to pick such insignificant items. I must have looked surprised, because he then asked if I knew that I didn't have to pick up that *type* of FOD.

I considered a witty reply and a lecture on duty and responsibility. In the end, my leadership training failed me and I walked away in angry silence. I needed time to reflect on why I stop to pick up such small items.

Why do I continue to pick up all the little FOD that others leave behind? Could it be habit? Maybe the Chief might be watching? Boredom? I've heard all the excuses for not picking up FOD: Aircraft never taxi on that part of the ramp; we need to pick up only metal FOD; our intakes are too high off the deck to pick up any FOD.

Then it hit me. FOD ingestion is only part of the problem. What about the injury to people or FODing an engine on another aircraft when the FOD gets blown down the ramp by jet blast? It can also ruin the nice new paint job of your favorite bird. Taxiing aircraft may not visit a remote part of the ramp, but what about tow tractors, trucks or other vehicles that can be unwitting FOD carriers? That twig or rock sitting on the ramp is just as dangerous as any lost nut, piece of safety wire or other metal FOD. I think that whenever you're on the ramp, you should pick up ***all*** FOD.

AT1 Bailey was in VQ-1 when he wrote this article.

QUALITY ASSURANCE

Heater Beware

by Capt. Kevin G. Emery, USMC

It was a cold winter day. Maintenance control spotted an H-46 in the hangar under a high-intensity heater for the comfort of maintenance crews who had to work a scheduled check. The free-air temperature 4 feet beneath the heater was 190 degrees F. The temperature 6 feet beneath the heater was 160 degrees F. Both readings were taken only 15 minutes after the bird was chocked.

The following morning during preflight, a plane captain found that 161 square inches of the aft red blade, located beneath the heater, had delaminated.

QA reps need to brief squadron personnel on this danger and keep an eye out for aircraft positioned too close to the outflow of heaters. Extreme or prolonged temperatures can damage fiberglass rotor blades.

ORDNANCE

Qualification & Certification: Take a Closer Look

by MSgt. Robert K. Smith

In investigating an explosive mishap, one of the first things we look for is the qualifications of the people involved. We scrutinize their training records because mistakes are usually caused by a lack of training or failure to follow SOP.

Military and civilian personnel who work with explosive materials or devices must be certified. The Navy and Marine Corps have amplified OPNAVINST 8023.2C to spell out requirements essential to building a solid explosives-safety program.

During surveys, I've seen interpretations of the OPNAV instruction from thorough and comprehensive to almost non-existent. Here are a few of the discrepancies I've found in aviation and shore commands:

We began surveying one shore command by checking the board chairman's designation by the CO. However, the board chairman could not locate his designation letter. Later, a signed copy, dated the day of the survey, turned up. Next, the training records of board members contained almost no proof that they'd received training for the explosive devices they were certifying others on. The command didn't have a training plan nor the means to support a training program, such as lesson plans or reference publications. The qualifications and certifications of several people were due to expire at midnight the day of the survey, and the command had not yet set up a qualifications-and-certification board to recertify anyone.

The most common discrepancy found during aviation surveys is the assigning of incorrect work-task codes. For example: Code 6 must be assigned when transporting explosives over routes and highways established for that purpose. And the driver must have an explosives-driver license to haul explosives. Work-task code 6 does not, however, apply to the flight line.

Another misused code is work-task code 5 (arm/dearm). We frequently find this code used with every explosive device on the qualifications and certifications sheet. The intent of work-task code 5 is to certify personnel in the safing and arming features of an explosive device or component. If none are present, a WTC-5 entry is not required. For instance: Rotating the safety-stop levers on MERs when practice bombs are loaded does not require a code 5 entry.

Review the codes you use on qualifications and certifications sheets. If you have doubts, make sure the entries match the definitions in the instructions for the functions you do with each explosive device.

Marines: Don't confuse maintenance functions with ordnance certification. An aircraft is a weapons platform and maintaining it is a maintenance function. Keep ordnance and maintenance entries separate when you document OJT. Ordnance qualification and certification is a separate program. Certifying personnel for aircraft release-and-control checks is not required because our maintenance-training syllabus covers it. This separation makes it easier for your board to see what each person has worked with and his level of qualificatiion.

One last tidbit: All personnel handling explosives or explosive devices must have a current explosive-handler physical. Several commands have not complied. OP 5 Vol 1, Chapter 2 has the details. Get your medical department to schedule your examination.

MSgt. Smith was an aviation-weapons analyst at the Naval Safety Center before he transferred to NAS Miramar.

Things That Go Bang During Maintenance

by Ed Luther

Of the 41 accidental detonations reported by aviation commands in May and June 1995, 33 were CADs. Maintenance people caused 20 and Ordnancemen fired three. Twenty-one of the 33 (64 percent) were fire-extinguisher CADS. A sampling of mishap narratives follow.

During a 28-day special inspection of an FA-18C, two parachute-harness sensing-release units (Seawars) were fired by a Fluke 77/AN multimeter during a voltage check. The tech had installed the leads on the multimeter incorrectly, and the CDI/QASO didn't catch it. When the leads contacted a sensor element, the Seawars cartridge fired. After resetting the meter, the technician tried to test the second Seawars unit and fired it, too.

Two AT2s were resetting chaff systems. One of the techs did a prep inspection on an FA-18. He didn't notice that the ordies had not removed the 20 chaff and 10 decoy flares from each of the two ALE-29/A modules. He entered the cockpit, applied power, and began to reset the system. The other tech approached the Hornet and asked the tech in the cockpit if he'd completed the prep check. His partner answered, "Yes," finished the reset, and began checking to make sure the chaff counter would count down. He heard loud pops and secured power. Ordnance personnel found six CCU-41/B cartridges and six rounds chaff expended.

Mr. Luther is a weapons-safety specialist at the Naval Safety Center. You can call him at (804) 444-3342/3343, DSN prefix 564.

May-June Conventional Ordnance Deficiencies

Type	Inadvertent Activation	Malfunction	Fail to Test	Observed Defect	Other	Total
Aviation	41	105	23	95	31	295
Shore	5	5	0	1	4	15
Submarine	0	1	0	1	1	3
Surface	1	29	5	6	6	47
Total	**47**	**140**	**28**	**103**	**42**	**360**

	Losses		Causal Factors			
Type	**Deaths**	**Injuries**	**Personnel**	**Material**	**Design**	**Other**
Aviation	0	3	57	204	1	33
Shore	0	2	7	7	0	1
Submarine	0	0	2	1	0	0
Surface	0	1	4	39	0	4
Total	**0**	**6**	**70**	**251**	**1**	**38**

LETTERS

Rats in the Airframe

by Ralph Murphy
January-February 1992 *Mech*

NAS North Island — Our paint and corrosion instructors use a lot of *Mech* magazine's articles as training aids for the corrosion class. One such article is "Rats in the Airframe." This is a particularly helpful piece because it has color pictures of several types of corrosion. Can you provide us with 35mm transparencies of each of the different kinds of corrosion pictured in that article? This would help students to better understand how the different forms of corrosion come about.

PRI Diosdado U. Pagador
Fleet Training Coordinator
NADEP

Thank you for the kind words. We can't make slides, but the photo lab at your air station can. Get the lab to take them right from the magazine. The drawings were originated by FAST, *Airbus Technical Digest of Blagnac France. We don't have the originals. — Ed.*

LOX of Luck

by AME2 Michael Ewert
May-June 1995 *Approach/Mech*

USS *Theodore Roosevelt* — The converter pictured in the article is an ARO type converter; I don't know if the one written about is an ARO. In the NAVAIR 13-1-6.4, this warning appears under emergency pressure-relief procedures for LOX converters: "Do not attempt to relieve pressure in LOX converters that indicate critical over-pressurization. For these converters comply with procedures prescribed in the individual station/ships emergency procedures bill." The difference between over-pressurization and critical over-pressurization is that one is easily corrected but the other is very dangerous.

The drawing of the ARO converter correctly identifies the dime-sized protrusion that appears when the ARO converter is critically over-pressurized. However, not all converters are identified as critically over-pressurized by a "dime-like protrusion 2-3/4 inches aft of top-dead center." For example: The Bendix has a one-inch long by one-quarter-inch wide frost band on it's center weld. The Essex does get a dime-like protrusion, but is not aft of top-dead center.

A dime-sized protrusion doesn't indicate that the inner sphere has ruptured, as stated in the article. The dime-sized protrusion is produced by the inner sphere compressing a probe between the two spheres into the outer sphere. This expansion of the inner sphere is caused by trapped LOX boiling off and building pressure. This causes the inner sphere to swell and eventually explode.

When a converter ruptures, it loses its evacuation between the two spheres (thermos bottle effect). This is indicated by heavy frost on the outside sphere, not by a dime-sized protrusion. Each command should establish an emergency procedures bill for handling critically-over-pressurized converters. A converter that indicates critical over-pressurization is like having a bomb ready to explode at any moment and it should be handled as such. Any person likely to confront this situation should be trained well in advance on specific procedures to follow.

PRC(AW) Russell B. Mahan
AIMD/IM-2

Tow-Tractor Lore

by AZCS Dan Steber
May-June 1995 *Approach/Mech*

NAS Brunswick — You ran an article in the Crossfeed section on tow tractors that had a handling test. Question No. 7 asked, "Do you thoroughly inspect the tractor for damage after loaning it to another squadron?" "Yes" was the correct answer.
I suggest the question should be, "Do you loan the tractor to other squadrons?"
"No" is the correct answer.

Any SE sub-custodied to a squadron from the SE pool is that squadron's responsibility. If the SE is damaged by a second squadron that borrows it from the squadron with sub-custody, the sub-custody squadron still gets the SE misuse-and-abuse report from the SE pool.

AS1(AW) John E. Reitman
AIMD

Critical over-pressurization is indicated by a protruding dime-sized extension, 2-3/4 inches aft of top-dead center.

Approach-Mech welcomes letters from all its readers. Letters should be signed, though names will be withheld on request. Address: *Approach-Mech* Editor, Naval Safety Center, 375 A Street, Norfolk, VA 23511-4399. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

It takes about 80,000 rivets, 30,000 washers, 10,000 screws and bolts to help make this aircraft fly... and one nut to destroy it.

Make FOD walkdowns count.

Poster idea from
AD1(AW) Kenneth Neal
VAQ 137